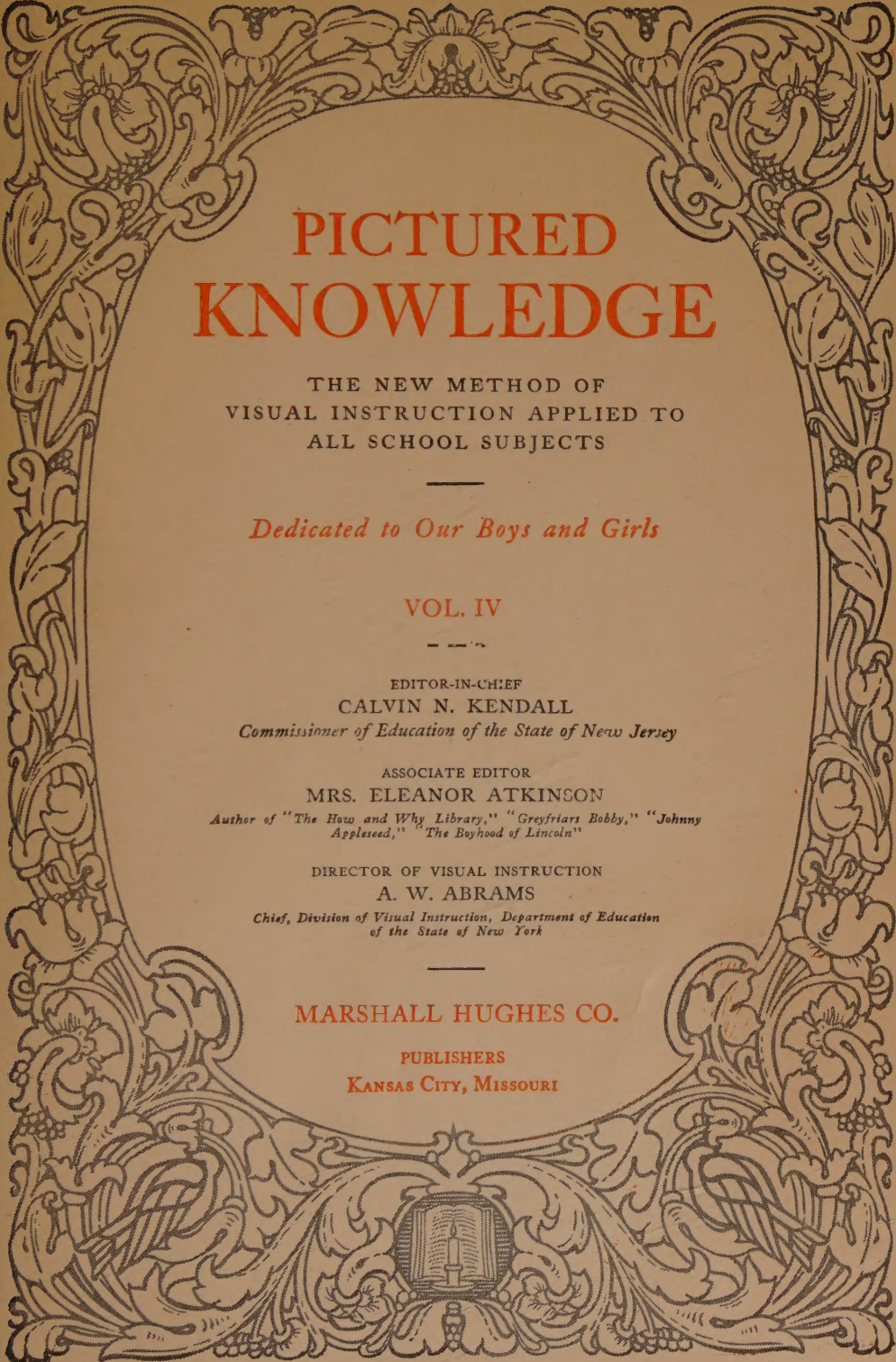


**"IN THE PAGES OF GOOD BOOKS
LIES THE MAGIC TO INSPIRE OUR
DREAMS AND THE POWER TO MAKE
THOSE DREAMS COME TRUE"**





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PICTURED KNOWLEDGE

THE NEW METHOD OF
VISUAL INSTRUCTION APPLIED TO
ALL SCHOOL SUBJECTS

Dedicated to Our Boys and Girls

VOL. IV

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A Beautiful Flower Design

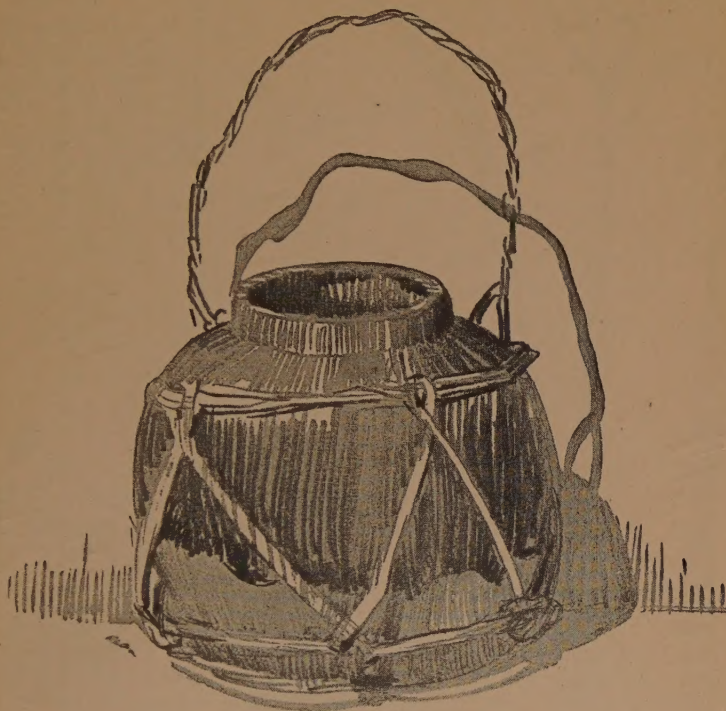


This beautiful flower design was made by a high school girl on gray paper with wash and a little Chinese white. No forms are more beautiful than those that nature makes in flowers.

LESSONS AT HOME AND AT SCHOOL

DRAWING

Learning to Draw



THIS is a big subject, for it really means art education. In whatever you undertake be sure to clearly understand that each of these things—drawing, design and color—is fundamental in a work of art and that all three may have an important place in even a single production.

The Three Important Points

When we gain ideas from having seen certain things we often want to record them on paper. We can do this in one of two

ways; we can either write the idea or we can make a picture of it. Of course, in the very beginning the first letters we learn, and which we now write so rapidly, were very carefully drawn, but as we only have twenty-six different ones to make and as we spend so much of our time repeating them they become so familiar to us that we do not have to think when we draw them. We just write them.

In drawing we never have time





Simple But Beautiful Designs

These are simple but beautiful designs, further illustrating the grace and variety of form in our common flowers. Such designs are easily made if you first draw careful outlines with ink, then fill in the leaves and stems with a light tint of wash, and add a few blacks.



12

to become as familiar with the forms, they are so numerous and so different. But there are certain principles necessary in all drawing and when these are well understood we can draw almost anything. Then there are certain types of objects which we should know, so that we can classify our forms.

Three types of objects suggest themselves. They are plant forms, animal forms and manufactured forms. Nearly everything may be placed under one of these heads.

Plant form or nature drawing includes the growing plants, berries and fruits, trees, vegetables and so on. We will first draw some of these.

Only a few materials are necessary; a camel's hair brush (No. 7), some black paint or ink, a pan of water, a blotter, a medium soft pencil (HB or B), and some drawing paper.

Small slender plants, such as grasses and sedges, are excellent for beginners in brush drawings, as a stem may be made with a single stroke. Bigger things, such as tree leaves and branches, fruits or vegetables, are adapted to pencil drawing, also.

The brush should be held almost vertically. You make

How to Hold the Brush

This is the proper way to hold your brush so that you can make your strokes slowly and carefully, yet boldly. The grass spray below shows result.



wide or narrow lines with it by a guided pressure of the fingers. It is well to try the brush first on a scrap of paper to see what it will do. Good drawing can be made only after the use of tool or brush has become familiar to you.

A good plan to follow in drawing a nature spray is to:

First, note the movement of the growth and the general direction. Has it an angular growth like the clover or the wild carrot or is it curving and graceful like grass or the dog-tooth violet?

Second, note the branching and division of spaces. Where is the first change of growth? How far above is the next branching?

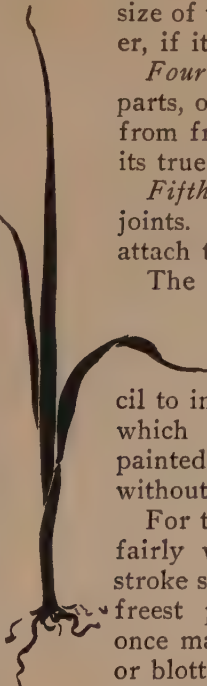
Third, note the proportion of parts. What is the relation of the size of the stem to the leaf and flower, if it has one?

Fourth, note the foreshortening of parts, or the relative width of a leaf from front to back. Does it appear its true size and shape?

Fifth, note its construction and its joints. How do the stems and leaves attach themselves?

The spray may be drawn in one of two ways. It may either be sketched, very lightly, with a single line of the pencil to indicate the placing, and upon which the brush strokes will be painted, or it may be freely painted without aid of any kind.

For this work the brush should be fairly wet but not dripping. The stroke should be made in the easiest, freest possible manner and when once made, it should not be altered or blotted out. In painting a spray of leaves the main stem should first



PICTURED KNOWLEDGE

The Gracefulness of Leaves

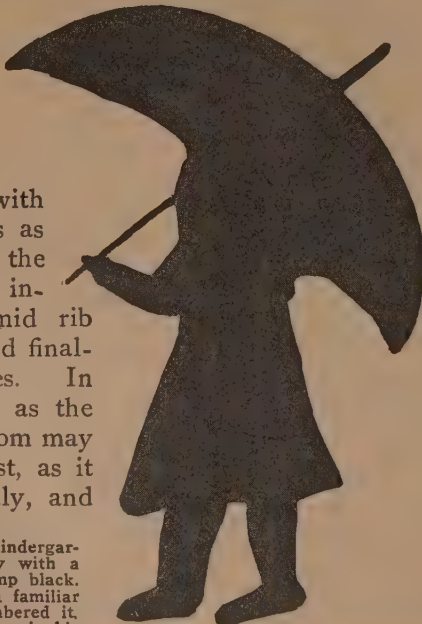


This picture shows careful study of leaves by a pupil in the grades. You will notice she has added some accents which suggests the thickness of the leaves. In adding your accents be careful to put them only where shadows are darkest.

By a Kindergartner

be swept in with as few strokes as possible, then the branch stems, including the mid rib of the leaf, and finally the leaves. In such a flower as the tulip the blossom may be painted first, as it wilts so rapidly, and

Here is what a kindergarten boy did simply with a brush and some lamp black. You see, he drew a familiar object as he remembered it. He expressed the idea in his



then the stem and leaves may be sketched.

First the objects may be made in flat silhouette. Not until the brush is a familiar tool should modeling or attempts at light and shade be made. Just how this is done will be taken up when we come

own mind and was not "afraid of himself." Such drawing shows natural talent and should be encouraged by teachers and parents.

See What Toyo Did!



You know that art is an instinct with the Japanese. Here is an example of it in the work of a little Japanese boy named Toyo, in the Fifth Grade of the schools of Los Angeles. He did this with a brush and a little lampblack on cream-colored paper. He used the lampblack heavy for the stems, just a little heavier for the berries, and very light for the leaves. Notice that some of the leaves are darker than others, which shows they are more in the shadow.

to consider the subject of color.

In pencil drawing two lines must be used to show thickness. A single stroke as with the brush will not show a stem. The object should be lightly sketched in to get it placed and properly proportioned. This insures a working foundation so that as the drawing progresses there is less need to think

of this essential placing. The various masses and shapes should then be carefully drawn and the joints searchingly observed. After all has been carefully rendered a few accents or slightly heavier strokes may be added. These should be made at some of the joints where little spots of shadow may be found and where parts of objects project toward the front. Only a few accents should be shown or the drawing will appear spotty.

How to Draw Animal Forms

Just as in plant drawing so in drawing animal forms the structure of the object should be carefully observed. This foundation may then be clothed or filled in and the form will have strength or what we call character.

In the beginning the brush may be used to form a silhouette, thus bringing out the individ-

ual shape. Afterwards if the skeleton in action is sketched first the finished drawings will be more truthful and life-like. We know that

A First Grade Wheelbarrow



This wheelbarrow was made by a First Grade pupil with red crayon on a rough surface paper. To be sure, the wheel is not exactly round, but it shows the little artist knows just how a wheelbarrow is made.

every animal has a head, a neck, a body, arms and legs. Drawing a few skeleton figures helps to show the different parts in their proper relation to each other.

In drawing ani-



And now look at this funny object on the left. Would you think that was going to be a dog? His neck is a little too long and he is made of blocks, but, at the same time, you see the form of the coming dog. If you study objects you will find that every one is shaped as if it were modeled around a cube—it has front, back, top, sides and bottom. So a dog, for example, may be said to be simply a set of cubes rounded off at the corners! Whenever you start to draw an object, sketch in lightly the combinations of cubes which you can imagine underlying its outward form. Then the handling of the light and shade will be comparatively easy.

mals the following points should be noted:

First, that proper action, that is, the twist or turn of the skeleton, will insure a good final form.

Second, that always in the young form the various parts are rounder and fuller than in the older forms.

Third, that if you think of the animal's method of existing it is always easier to draw it. For example, a duck swims and so its legs are short, its feet are webbed and its body is built low with a heavy stern like a sail boat; but a hen walks on the ground and her legs are longer, her feet are stronger and without the webs, and her beak is pointed and sharp



so she can peck at her food.

The pencil is a fine medium for animal drawing, and should be handled just as in the drawing of

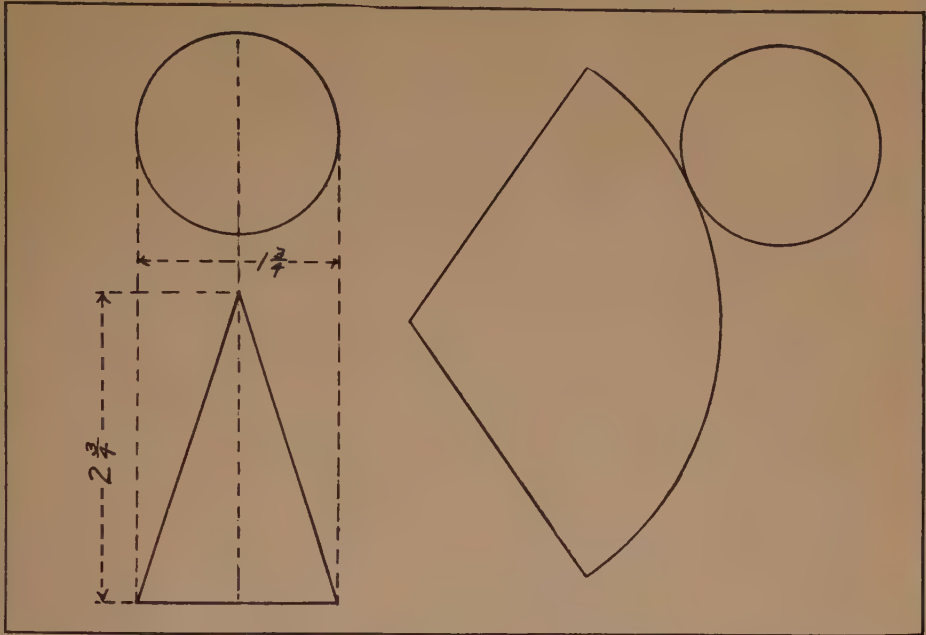
plant forms. A little colored crayon touched in after the drawing is made sometimes works up very effectively.

The Picture Language of Mechanics

There are two kinds of drawings commonly used in connection with manufactured forms. The word manufacture at once suggests one kind of drawing, the working drawing. This is a drawing made so that a manufacturer can work from it and reproduce the object drawn any number of times.



Working Drawing of a Cone



This is what is known as a "working drawing." It is the plan for a cone. The base is represented by a circle at the top, which you see is $1\frac{3}{4}$ inches wide. Below this is the side view, which shows that the cone is to be $2\frac{3}{4}$ inches high. The bottom of this side view is, of course, the same width as the base. At the right is shown a piece of paper cut out according to these dimensions. First make similar drawings on a piece of stout paper, and then cut out the parts and see how nicely they fit together.

Such a drawing may be made free-hand and is then called a shop sketch, or it may be made mechanically by the use of a T-square and triangles.

When a working drawing is made, separate and detached views showing only one side of the object at a time are given, but they are placed in a certain relation to each other. The front view, which shows neither side nor top, is usually placed beneath the top view, to the left of the right side view, and when this view is necessary, which is not often, to the right of the left side view. Then below and at the right of these views the figures or dimensions are placed. These show how big the object is to be made.

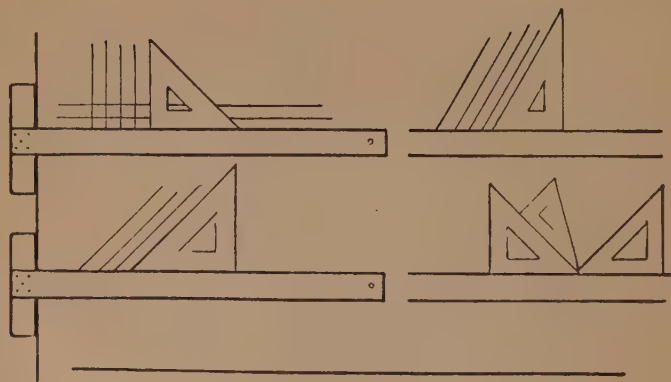
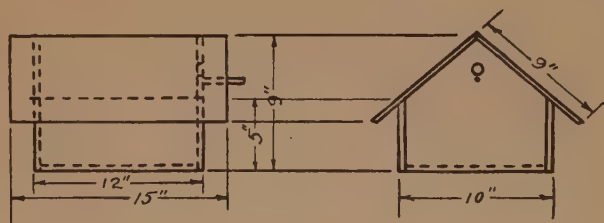
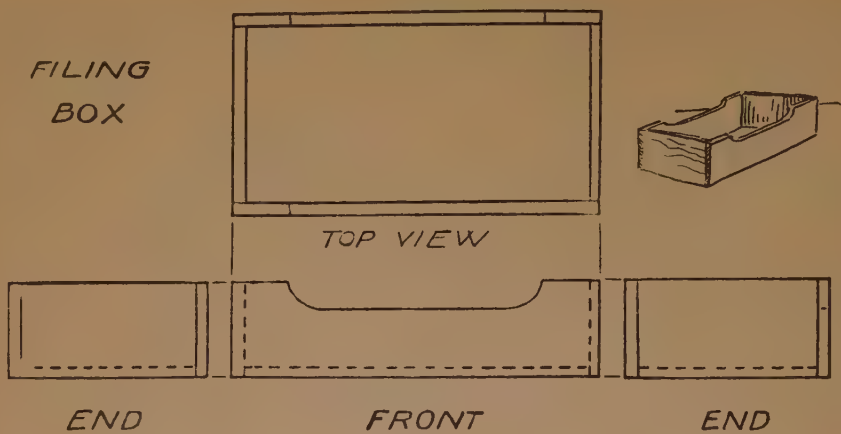
The working drawing is a most

important form of drawing, as such drawings must always be made before any manufactured objects are constructed. Steps, posts, lamps, automobiles, houses, everything that is made in a factory or anywhere else requires a working drawing.

Because they are so important certain lines and figures are always made in the same way in these drawings. The illustration will show these conventions and also the T-square and triangles. For mechanical drawings a fairly hard pencil should be used (4H), and all lines should be lightly drawn except in the finished work, when the lines showing the object may be heavier.

The paper should be placed by means of thumb tacks upon a smooth

FILING
BOX



Object Line

Invisible Edges

Extension Lines

2'-4½"

Dimension Lines

board which has a straight edge at the left side. The head of the T-square is then held firmly against this edge and run smoothly up and down the side as needed.

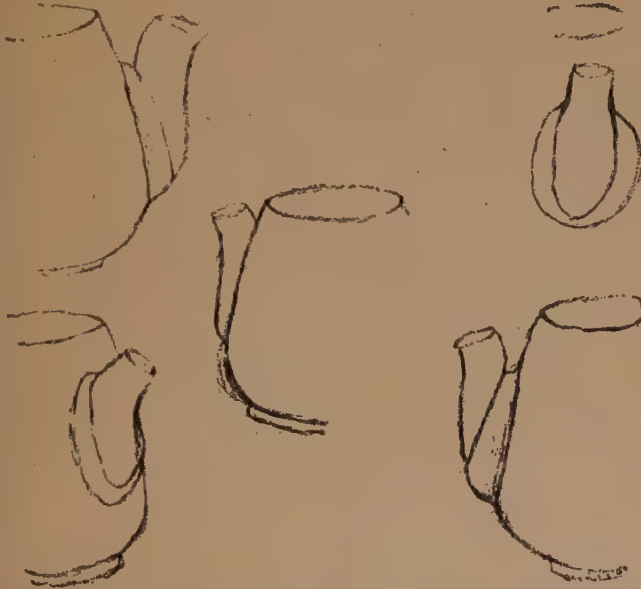
How to Make Working Drawings All horizontal lines are then drawn against the upper edge of the T-square. The triangle always contains a right

meet at corners without overlapping, distances and measurements must always be exact.

Second, only what is necessary for the workman must be drawn, yet at the same time nothing essential to him must be lacking.

Making Pictures of Manufactured Things

Studies of a Teapot Spout



From these studies of the spout of a teapot you can see how to go about the study of form. Notice that the spout is studied from five different positions. By the time you have made this number of studies of such a simple object you should be able to draw it, with fair accuracy, from memory.

angle. One side of this right angle is placed on the upper side of the T square and all vertical lines are drawn against the other side of the right angle. In this way all lines perpendicular or at right angles to each other may be quickly and accurately drawn. For curved lines, of course, compasses are used.

In mechanical drawing the following things must be noted:

First, everything must be accurately drawn, that is, parallel lines must always be parallel, lines must

The other kind of drawing from manufactured objects is like our nature and animal drawing and is called representation. The very first may be made flat, showing only the shapes. These may be filled in or they may be left in outline. The object must be carefully observed as in our previous drawing and then all its characteristic shape should be represented. Following this we may try for more truthful representation.

Unlike mechanical drawing we seek to

picture an object as it appears to the eye. To do this we must understand what are termed laws of perspective. These laws are only necessary in the representation of thickness or depth. Therefore, while unnecessary in the working drawing because the separate faces are drawn, they are very essential where two or three sides or faces of the object are shown in a single drawing, as in representation.

Roughly, manufactured objects may be divided into classes, round or cylindric forms and rectangular

How to Draw Cylindrical Objects

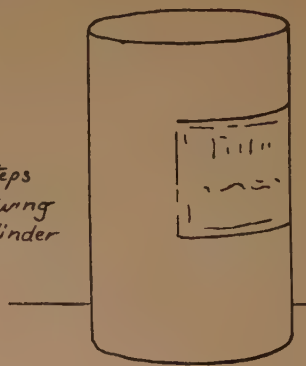


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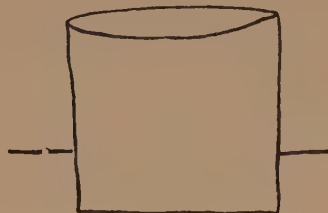
3 Steps
in drawing
the cylinder



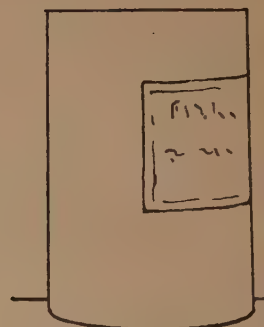
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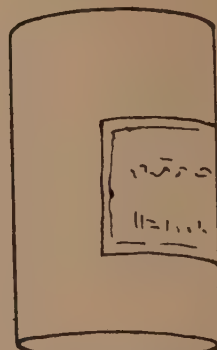
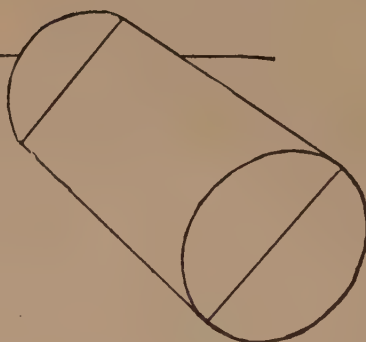
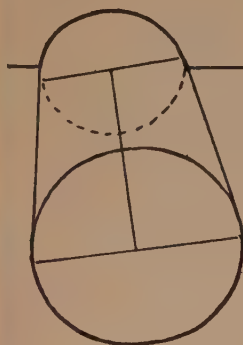
Painted ellipse



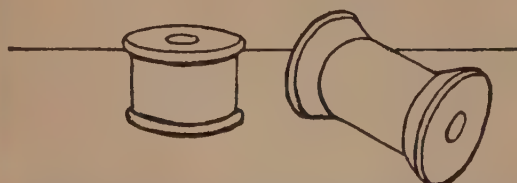
Incorrect



Top ellipse on eye level



Above eye level



These photographs show you how to draw different objects of a cylindrical shape. One of the difficulties in drawing a cylinder in certain positions is to represent the ellipse correctly. A common mistake is in making it pointed at the sides. Try first drawing the ellipse itself, then add the sides, as in Figure 2. Then erase all of your construction lines, put on a bottom, and you have a cylinder as shown in Figure 3. After you have practiced drawing a can at different elevations, try a spool, as shown below, which gives you the problem of several ellipses fitting together. Little as you might suspect it until you try it, this is a rather difficult drawing to make.

LESSONS IN DRAWING

forms. Cylindric forms of plain shape are simple objects with which to begin.

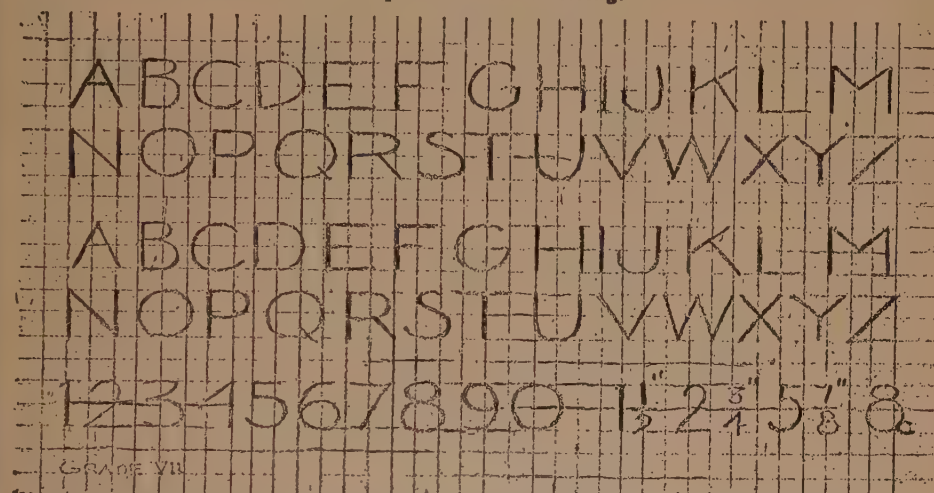
The common objects found in the home, such as kitchen utensils, serve as excellent models. An ordinary glass cup or jar is good. This should be placed in front of you so that you can see partly into it. The sides, you will notice, appear as straight

*Fine Models
in Your
Kitchen*

If the object is raised so that the top circle comes on a level with the eye you will notice that it then appears as a straight, horizontal line. As it is still further raised the ellipse appears again but this time the front edge curves upward.

In drawing the object it may first be roughly located. Then the top ellipse may be lightly drawn just as narrow as it really appears. The

To Improve Your Lettering.



Square off some paper with a pencil and try these free-hand letters, making them fit into the squares, as shown. After you have practiced this a while you will find that the lettering you do looks much neater than before. Our illustration is an example of commendable Seventh Grade work.

vertical lines, but the top and bottom which you know are actually circles look like ellipses with the front edges curving downward. You will also notice, if you look carefully, that the bottom ellipse, or the ellipse which is farther from you, looks a little wider from front to back than the top or nearer one. This fact is very important and if once remembered you can draw any cylindric object without looking at it. And this holds true whether the object is on its side or end for the ellipse which is farthest away always appears widest.

sides may now be dropped from the ends of the ellipse, always being sure that they are kept straight and parallel. All this is much more quickly drawn than written. In fact, this first sketching, done ever so lightly, should be accomplished in half a minute at most.

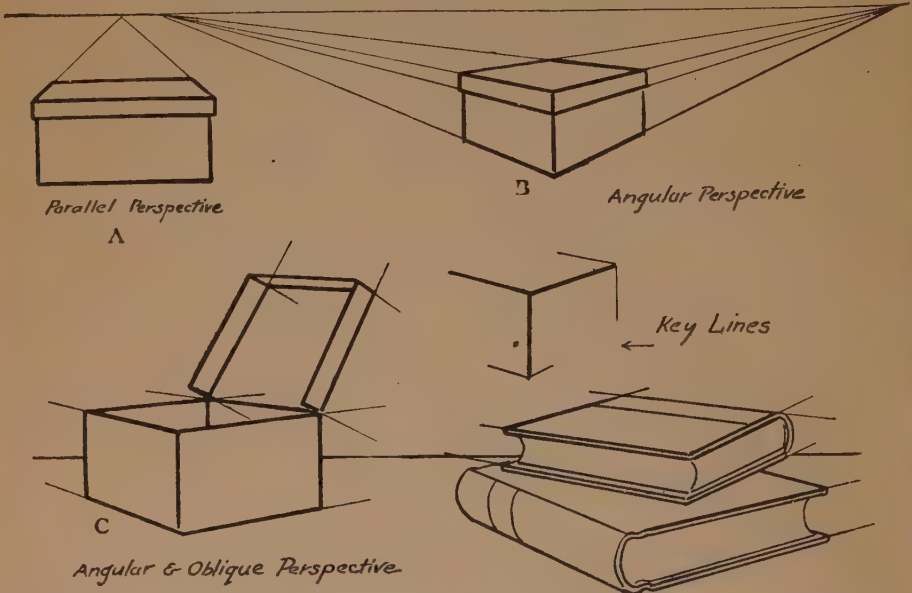
*Sketching
Should Be
Rapid*

After the top ellipse and the sides are sketched the lower ellipse is lightly suggested. The drawing should now be tested. Are the ellipses too narrow? Does it seem to fill the paper well or is it too small? Is it too tall or short?

When these questions are answered the corrected lines may be gone over with a heavier stroke and a slight accent where the curves of the ellipses come toward the front. This tends to emphasize the third dimension or thickness. Of course the lower ellipse shows only the front half unless the object is transparent

only two faces and is said to be in parallel perspective because its front is parallel to an imaginary plane placed between the eyes and the object. To simplify matters we might consider the drawing paper this plane and on that we represent the object. B shows three faces. Because the corner is pointing toward

Illustrations of the Laws of Perspectives



enough to permit the whole of it to be visible. Unless the ellipse is seen as a straight line the ends are always curved, never pointed. Where the side, represented by the vertical line, joins the ellipse there should be noted a smooth flow into the curve of the ellipse—never an angle. These points are important and are constructive features to be followed in any cylindrical object.

What a Box Can Teach You

Rectangular forms offer new perspective elements which must be observed. A simple box is shown in two positions, A and B. A shows

our plane with the sides at an angle to it we say it is in angular perspective.

If we open the cover as at C, we note that the cover is at still a different angle to our paper or plane. This we say is in oblique perspective.

Any simple box is a good object with which to begin drawing. At first it may be placed in the position of A. Note first, as in all representative drawings, the general proportions. Is it too long? Too short? Too deep? Then note that the back edge is shorter than the front edge. Therefore the side edges must slant

Questions to
Ask About
Your Box

in as they retreat. There is another reason for this slanting or convergence. If you look down a long straight street or railroad track you will see how the sides of the street or the steel rails appear to come together. You will note also that if

*The Great
Law of
Perspective*

they were carried on and extended they would appear to meet on a level

with the eye, or at the horizon, which is always at the eye level. So in the box the sides of the top which retreat from you appear to converge to a point on the eye-level directly in front of the eye.

In B, however, the sides retreat to the left and to the right, yet they, too, converge to points on the eye-level. Notice here also that the base lines of the box slant up and converge to the same points at the right and left. There are then three pairs of visible lines on either side of the front vertical edge and they are all parallel. As they all appear to converge at the same point we can formulate this very important perspective rule—*all parallel horizontal and retreating lines appear to*

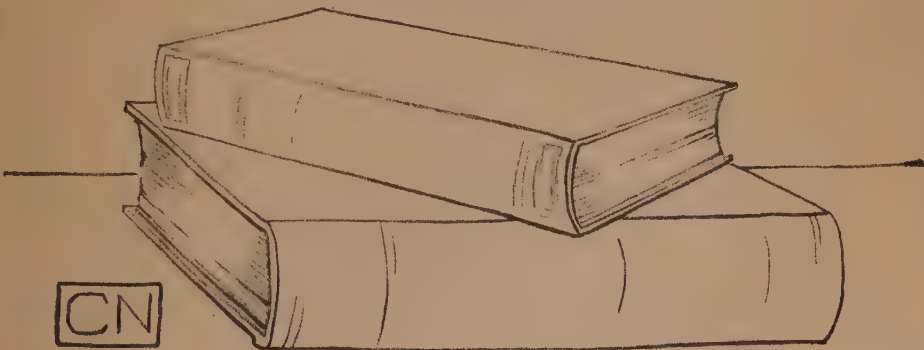
converge to a point on the horizon or eye level. When the lines are below the eye they slant up to the eye level; when they are above the eye they slant down to the eye level.

Remembering this it is a simple matter to draw almost any rectangular object. Always in beginning the drawing of the rectangular form the three key lines should be sketched first. Then the other lines are easily added, but always make it a point to show the slight convergence necessary.

How to Deal with Group Figures

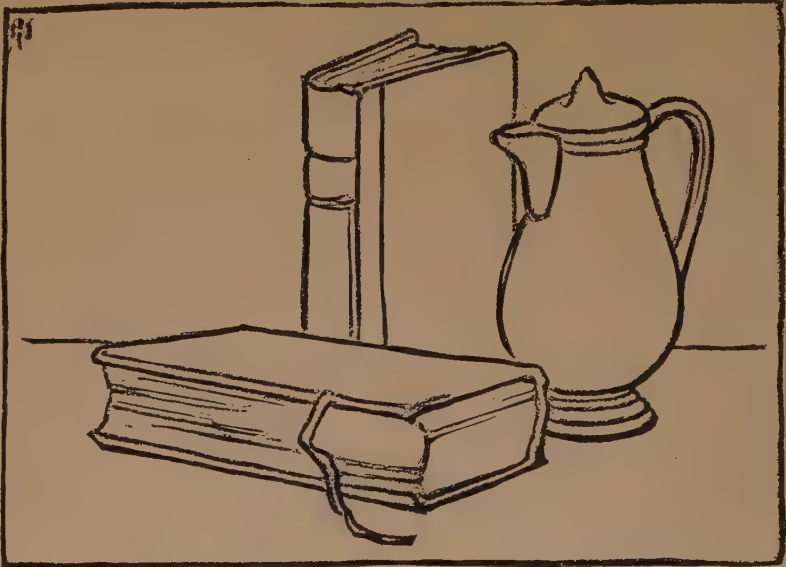
The last point to be considered is grouping. In drawing the group it is well to consider it as a whole and place marks to indicate the highest, the lowest and the widest parts first. With very light lines block in the group and the individual objects. A careful test follows and when all has been carefully scrutinized the lines are drawn much heavier but with thoughtful precision. The nearest lines may, as a rule, be slightly heavier than those farthest away. Of course two objects can never be in

A Little Problem in Book Drawing.



After you have grasped the principles of perspective from the picture on the opposite page, take a couple of books and try drawing them as this boy did. See if you can make them look as if they were lying on the table and as if one side were just as long as the other. Then put in a few accents, and you will have quite a professional-looking drawing. The two letters in the corner are the signature of the young artist. But there is another reason for putting them in just that place, and that is to give balance to the picture.

PICTURED KNOWLEDGE
Some Cylinders and Rectangles

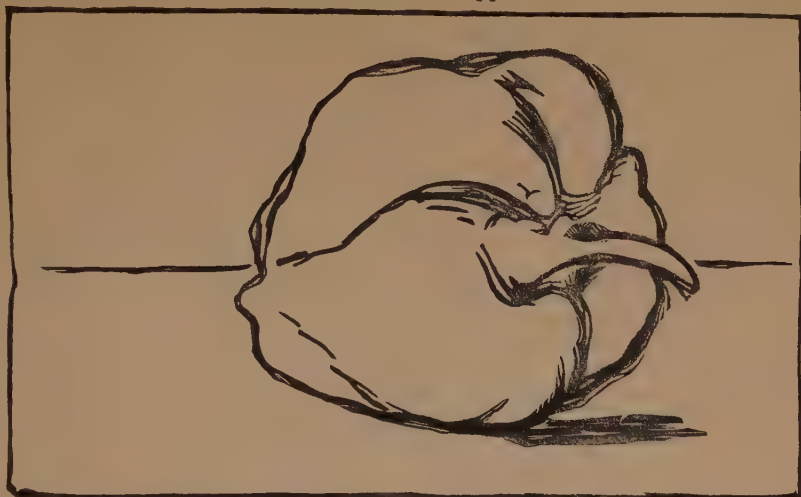


These illustrations show common objects of cylindric and rectangular shape, suggesting general constructive features, as thickness, proportion, etc.

Illustrations of Accented Outlines



Here are some more complicated objects of the common type, showing accented outline. This drawing is more complicated than the preceding and you should not attempt it until you have mastered smaller and simpler objects.



Here is a very good sketch of a green pepper. The outlines have been followed very faithfully. You can see the person who made this was not afraid of getting a line in the wrong place, but, having had practice and knowing what she could do, went at it boldly, and the result is these simple, strong expressive lines.

the same place at the same time, so in our group the object nearest us must be lower down on the paper.

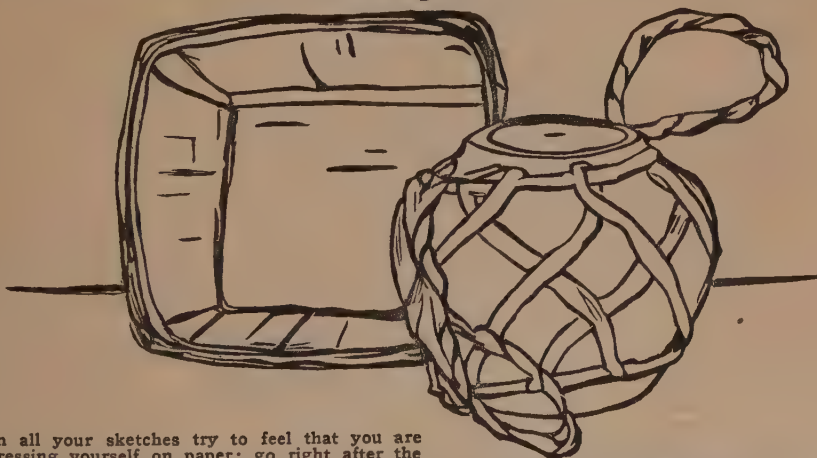
Good groups show some variety in form, though never too much. A tall bottle and a pill box are not a pleasing group, because of the great contrast. Two or three oranges and

*Law of
Harmony in
Grouping*

a bowl, or a book and a candlestick are usually good.

The illustrations show some possible groups and also a simple treatment of shading. In shading with the pencil simple, direct and thoughtful strokes, following the general direction of the surface and suggesting part of the shadow only, are

The "Feeling" in Lines



In all your sketches try to feel that you are expressing yourself on paper; go right after the lines as if you meant business. Make them light or heavy—just as you feel they should be. In your accent lines bear down just as hard as you want to on your pencil. In most of the drawings shown here the pencil pushed through the paper where the heaviest accents were made. Whenever you think best put a little border around your picture. This will often make it look better, just as the borders around the pages of this book improve the appearance of the book.

quite satisfactory. Never rub the shading and never seek to put all you may see in the drawing. Just the stronger notes with accents at joints or points of contact are sufficient.

The Principles of Design

When a person makes something to meet his particular need we say he designs it. And likewise when decoration is added or applied to its surface we again use the term,

The Two Forms of Design

saying that he has added 'a design. Design, then may be divided into two classes, Constructive Design and Decorative Design. The one deals

A Conventional Design



Here is what is called a conventional design. It was made by a student for a spring program at school. Notice how simple it is and at the same time how well balanced and pleasing.

carving is an example of decorative design.

Underlying all good design, whether constructive or decorative, are certain fundamental or first principles which are quite essential. In order to know how to design it is important that these principles be studied.

The first principle is *Order*, the very first law of the universe. Any good design must be orderly. A few

lines or spots scattered at random are not good because there is no order, but arranged in a systematic fashion the result is a more or less pleasing design. You will see immediately, then, that any decoration

ORDER



VARIETY



Examples of Order and Variety

with the form and function or use of an object, the other deals only in surface ornament. Therefore a chair, a table or a paper-knife is an example of constructive design. A poster, a bookcover or a piece of

which is good requires this orderly thinking and development.

The second principle is *Variety*. We may have an orderly arrangement of lines or forms but it still may be uninteresting and monotonous.

onous. A good design will always show some measure of variety or change. It may be ever so little yet still afford more pleasure than would be found without it. The lines used to illustrate the principle of Order may be varied and while keeping to an orderly arrangement the effect is doubly attractive.

usually have their pivoting or balancing point which is always in or near the center of the decorated space. Upon this imaginary though important pivot all the parts and colors of the design must balance. A bisymmetrical design, where the left half is identical, or nearly so, with the right half, only requires adjustment between the top and bot-

Examples of Balance and Adaptation.

BALANCE



ADAPTATION



The third principle is *Balance*. All good designs are well balanced. There are two kinds of balance; the balance of equal parts or bisymmetrical balance, and the balance of unequal parts or occult balance. The latter is a balance which is observed and determined largely by feeling. The principle is best illustrated by the common "see-saw." Equal weights will balance at points equally distant from the pivoting point. Increase the weight of one end, providing the pivoting point remains at the same place, the larger weight must, in order to balance the smaller one, move in nearer the pivot.

Designs which are not borders nor repeated patterns covering unbounded areas, such as wall papers,

tom so that the weights above and below, balance near the center of the space. This is comparatively easy. But where the decoration or arrangement of masses is not bisymmetrical it requires careful and thoughtful judging and estimating to make sure of proper balance.

The fourth principle is *Rhythm*. Beautiful designs have a swing or graceful movement similar to that found in poetry or music. The lines illustrating Order are more or less rhythmic because there is a movement from one to another but when Variety is combined with Order and there is a distinct accented movement, we have Rhythm. Rhythm is found in the repetition of lines, masses and colors and in single lines

RHYTHM



Examples of Rhythm

and curves.

The fifth principle is *Adaptation*.

Principle of

Adaptation

This is perhaps the most important principle and immediately determines whether a design is good or poor. Adaptation includes four important things:

(a) The shape must be adapted to its purpose.

(b) The material must be adapted to its use.

(c) The construction must be adapted to the material.

(d) The decoration must be adapted to the material, the construction and the space.

Every design demands one or all of these requirements depending upon the kind of design. (a), (b) and (c) concern only constructive design and (d) applies only to decorative design.

There are other principles of design but these five are sufficient for the problems we will consider. In good designs all five may be found supplementing and aiding each other to make

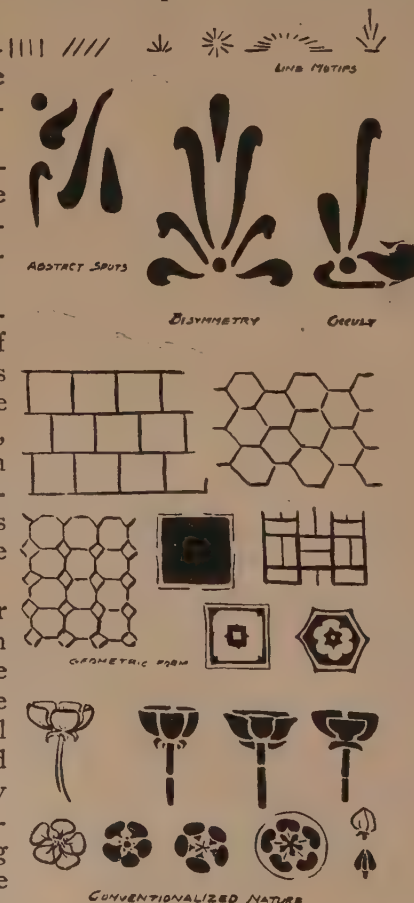
the result not only a good design but a beautiful one.

"Handsome is as Handsome Does"

In constructive design the purpose or use to which the object is put determines its general shape, style and construction. In decorative design, however, the problem is different. Something must be used as a decoration and just what it shall be

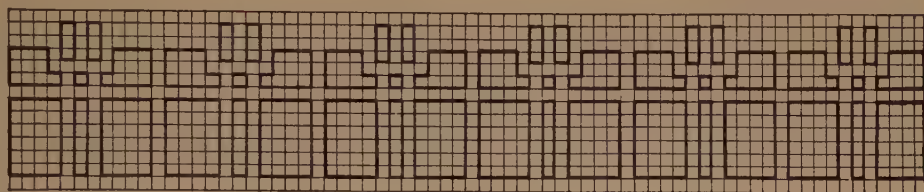
is not so easily determined. It may be a line, a geometric shape, an abstract spot or a conventionalized nature form. These are called motifs of design. The line may be used as inlay in a box, the geometric shape may be applied to a floor, the abstract spot may be pleasing on a curtain and the conventionalized nature form may adapt itself to a wall paper.

We will first try to work out some of these motifs. With the pencil or brush, lines may be quickly made. They may first be placed in vertical rows, then slanted, then tied together in simple shapes. A few abstract spots may be made on a sepa-



LESSONS IN DRAWING

A Conventional Design



Squared paper is a great aid in making conventional designs. Here a pupil has made a sketch of a butterfly. Then he has simplified it and kept on simplifying it until he has the conventional design shown in the squares.

rate sheet of paper, painted and then cut out. These black spots may now be shifted and arranged to form a pleasing bisymmetrical unit and one with occult balance. By using five different spots varying in shape and size an interesting game may be played.

The geometric motifs consist merely of the common forms such as the square, the triangle, the pentagon, the hexagon, etc. These may be used singly or united in pleasing surface designs. The boundaries of such forms, their centers, their corners, their diagonals and their axes may be greatly varied, often with most delightful results.

Nature As a Source of Design

One of the most common sources of design motifs is Nature. She is so wonderful, so orderly, so varied, so balanced, so rhythmic and so well adapted to her purposes; in fact, she shows all the principles of good design so beautifully that designers have gone to her for their designs

since the beginning of time.

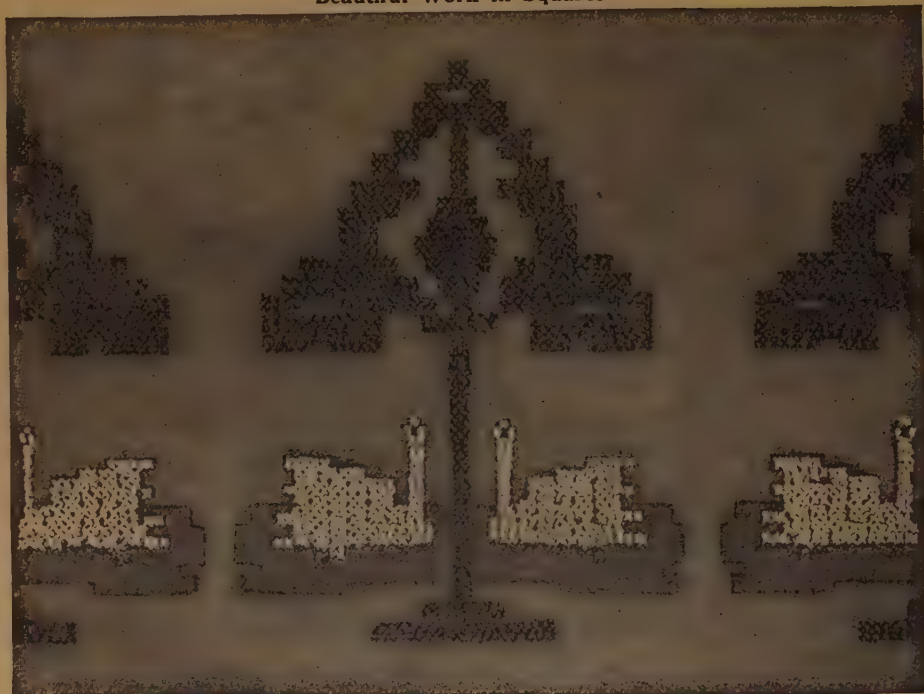
Good design never allows nature to be imitated and exactly copied. But when used for decorative purposes we must simplify her and conventionalize her. This means that we are subduing her freedom and are placing her within certain bounds and limits. The more formal and dignified and sober the purpose of the design, the more restricted and conventional must the nature motif become. For example, a cover design for a school report would be more conventional than a design for an Arbor Day program.

When we conventionalize we must never lose the big characteristics of the flower or form and its growth. In conventionalizing a few careful drawings should first be made directly from the natural specimen. Then, after noticing closely the growth and individual form, we may simplify by keeping boundary lines simpler, by separating parts or by enlarging spots. A second step may follow when the various parts may

*Steps from
Nature to
Convention*

PICTURED KNOWLEDGE

Beautiful Work in Squares



Isn't this a beautiful design made up of squares? It is done on yellow paper with pencil and some wash and a little white. Of course, these are not true pictures of swans, but, at the same time, it is quite clear that a swan was used as the foundation for the design. So with the design of the tree. These figures, constantly repeated, make a very tasteful border decoration.

be slightly changed or still further simplified, but all the time keeping to the character of the original form.

The various design motifs are always results of thoughtful effort on the part of the designer. They never come without considerable trying so it is wise never to get discouraged at first results. Just keep at it and soon something good



This is the cover design of a little booklet made in school. It contains a composition on flowers.

will begin to appear. Then follow it up and finish it.

A good way to begin to design is to use squared paper. This paper has lines running across the surface at right angles forming little squares. Interesting units and motifs can be worked out in a bisymmetric arrangement or an occult balance. It is fun to draw a bird or some animal in the squares,



You know the whole world of words is made up of only twenty-six letters; but did you know that the alphabet of the world of colors has only three letters in it? With the primary colors—red, yellow and blue—in various proportions and combinations, nature and the artists “write out” all the wonderful color messages they bring to us.

This color chart illustrates how the primary colors are combined to make new colors, just as letters in words are combined to make new sentences. Red and yellow, equally mixed, give

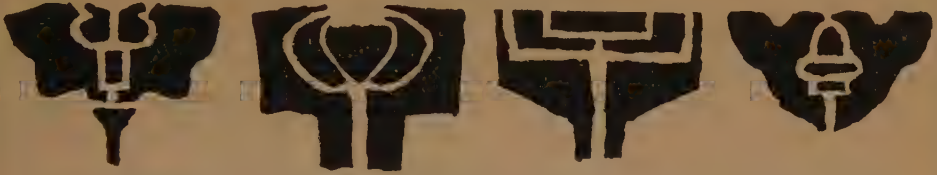


orange; yellow and blue, green; red and blue, purple. The second row of blocks shows how the colors are mixed. You put a block of red paint alongside a block of yellow, for example, and then, while they are wet, by a zigzag movement of the brush, you mix them. The last block on the right shows how all three primary colors are mixed to produce what is called a neutral tone, which is used in representing the colors of the bare ground, tree trunks, and so on.

The picture below shows how the artist uses colors in making a landscape composition.

LESSONS IN DRAWING

Wood Block Designs



These are different designs suitable for wood blocks. They are made from a study of flowers.

always being sure to use squares and not curves to make the figure.

Now for Constructive Design

A constructive design will be our next problem. Perhaps a paper cutter will be good. The first point to think about is its purpose. It is to cut the leaves of a book or open envelopes. Therefore it must have a handle and a blade.

The next thing to consider is the material of which it is to be made. Shall it be metal or bone or wood? Let us select wood as it is easy to cut and it is light. The next point is size. Of course it must not be very large for envelopes are not large and it must not be too small or we could not handle it. Our hand, then, gives us a clue as to its size. Nat-

A Cover Design

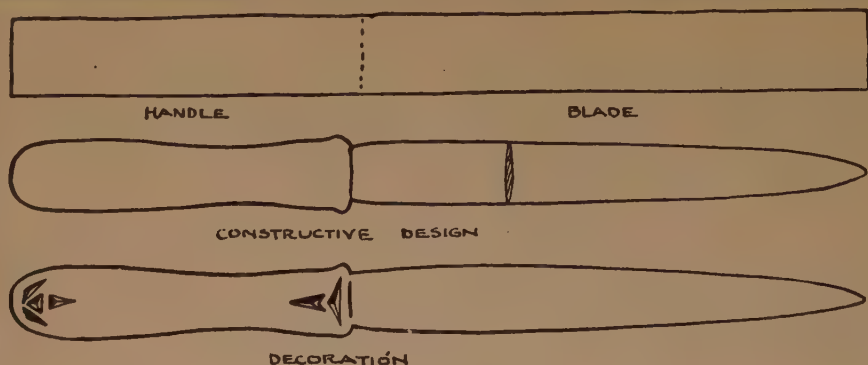


Nature is closely copied in this design. In such work, if you think a flower would look better in a different position, make it so, being careful to have the general character of the plant correctly represented.

urally the blade will be a little longer than the handle and so we soon arrive at seven or eight inches as a suitable length.

The next question is the shape. It should feel good to the hand which grasps it; it should be rounded on the handle so that there will be no sharp edges. The blade should be thin and wedgelike so that it can slip between paper. It may have a long curved edge, as it cuts better.

At this point we can begin to make sketches on paper. And now we must think of some of the principles. Unconsciously we have been considering Adaptation but now we can consider Balance, Rhythm and Variety. The knife should balance well in the hand. Its lines may be varied and at the same time rhyth-



DESIGN FOR PAPER KNIFE

mic. So gradually the design appears and after refining and purifying the lines and shapes we produce a more or less beautiful piece of constructive design.

Design for Decoration

Having designed a paper knife we may now think about still further beautifying it. Can we decorate it and if so, how? Again we must consider the material. As it is wood it can not be enameled or pierced as could metal. It may, however, be carved or burned or inlaid or merely polished. Let us consider carving it. This means that the design is either to be cut into the wood or left while the background is cut away. The illustration shows both methods. The first is the simpler after the design is once thought out. On such a small object the design cannot afford to be elaborate. Therefore, a simple line effect or small abstract spots may be adapted.

A decoration must never hide the construction of an object, so the design must necessarily follow the general outline or emphasize the purpose or use. It may emphasize the handle, the joint between handle and blade, or the blade.

One other example will be sufficient to show how designs are worked out. This time we will plan a book plate. A book plate is a label to be pasted inside the cover of a book, which tells the owner's name and has some decoration to show what he likes or is interested in. This decoration may be a book and candle or some animal, a flower, a landscape, a boat or some other interesting thing. It also contains the Latin words *Ex Libris* (meaning, "from the library" of the owner) or the words *His Book*, as well as the person's name. Sometimes a short poem is added. In fact, a person may use most anything he chooses and the problem for the designer is to arrange these things in a pleasing decoration. We will use in our plate the violet, some books and an ink-well, with an old-fashioned quill pen.

The first thing to consider is the size of the plate. As it must go in small as well as large books, three inches by four inches will make a good size. The next thing is to consider the method of making it. As we need a large number of the same

book plates, we will have them printed and that means that the drawing will be sent to an engraver who will make a zinc plate from which the prints are made. As he would prefer a drawing larger than the final print, because when made

ety. Next we block out on the good sheet all that we are going to do, first drawing a vertical middle line upon which we will balance the design. Then the lettering must be very carefully blocked in with faint horizontal lines at the top and bot-



Sketch



-Final -
Drawing

smaller by the photographing machine it is greatly improved in appearance, we will make our design

*Trying Out
Various
Ideas*

just four times the actual size for the book. A

large drawing is also

much easier to make. We must now make some sketch notes to block out an idea for the design. The name may be at the top or the bottom, the violets may form a border or we may have straight lines. In this way we put down several suggestions and finally decide upon the most effective and pleasing one. In making these sketches we must seek for good order, proper balance and simple rhythm in spacing and line. The number of things entering into the book plate gives us at once Vari-

tom of the words, for guides. Following this we may make a drawing of the book and ink well and last of all the conventional violets which will serve as a border.

When all lines are laid in, we must go over them with great care in ink, after which all pencil lines are cleaned off and any corrections made. The design is now complete.

All designs must be considered just as carefully as we have considered these. The purpose, the material, the construction, the shape, the size; all these questions enter into every design made.

Appreciation of the Work of Artists

When we try to draw or paint we at once begin to appreciate how

beautiful the great drawings and paintings are and how wonderful are the artists who made them. From the experiences of our own attempts we are able to look at the masterpieces from the standpoint of drawing and color and, to some extent, design. For any great picture is orderly and balanced and rhythmic. In studying pictures further, however, the following should be considered:

1. The name nationality and date of the painter.
2. Any features in the picture

showing foreign things.

3. What story is told.
4. On what the interest in the picture centers.
5. What time of day or year is suggested.

6. Whether it suggests a similar experience in your own life.

In addition, each picture would present its own questions. Penny pictures may be purchased and a booklet of your favorite pictures will make an excellent design problem, especially if you design a cover in colors.



PROGRAM

LESSONS AT HOME AND AT SCHOOL

SEWING

The Little Needle-Woman



© Keystone View

How to Sew, Mend, and Make Different Stitches

ISN'T this a busy group?

The little girls in the picture are having a pleasant time, and at the same time learning the useful and fascinating art of sewing. They have a delightful place to work, too—have they not? See the roses on the other side of the fence? That fine old tree protects them from the sun and the wind, too.

The teacher is showing one small girl how to measure a hem properly—can you see the tape line she is holding? One little lady has laid down her work to look at us.

Perhaps she is too shy to work before so many other folks.

The teacher says that she will tell you how to sew, also; she says it is very easy to learn to sew, sometimes it's like playing a game.

We will begin the game with the running stitch, because it is so easy, and then "running stitch" sounds as though we too will soon be able to make a dress.

Make a knot in the end of your thread this way. Hold the threaded needle in your right

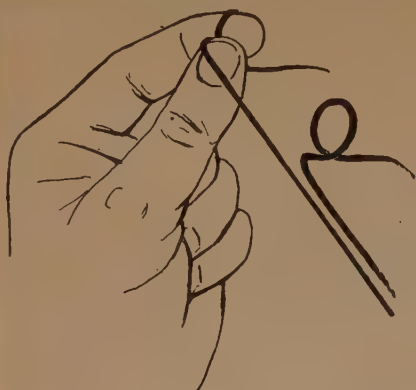


Fig. 1. Making Knot in End of Thread.

hand, with the left take the long end of the thread between thumb and first finger, stretch the thread tight; then wind it once around your first finger, crossing it over that held between finger and thumb Fig. 1. Press the first

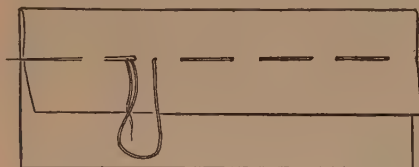


Fig. 3. Basting With Long Stitches.

finger against the thumb as you rub it down carrying the thread along. Push the knot you have rolled to end of the thread; then begin sewing, running your needle in and out of the material, Fig. 2, making stitches the same in size.

Basting is running with long

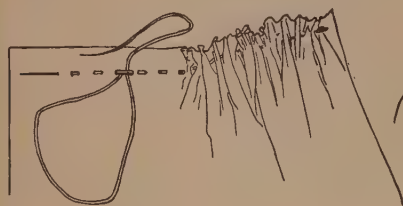


Fig. 5. Gathering.

stitches Fig. 3. Fig. 4 gives wrong side.

Gathering is running by taking up two threads and leaving four, Fig. 5. When finished, push the stitches

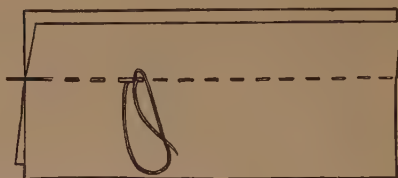


Fig. 2. The Running Stitch.

together and stroke the gathers with coarse needle as in Fig. 6.

In stitching begin by taking a stitch two threads back of needle and two before, then continue in this way making each stitch meet the last as in Fig. 7.



Fig. 4. Wrong Side of Basting.

Backstitching is made two threads back and four forward as in Fig. 8.

In overhanding hold the edges of cloth firmly between thumb and first finger of left hand, and sew across over the top of the edges, keeping the edge next you tighter than the other as in Fig. 9. Open

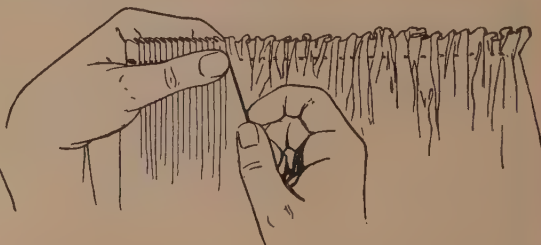


Fig. 6. This Is the Way to Stroke the Gathers.

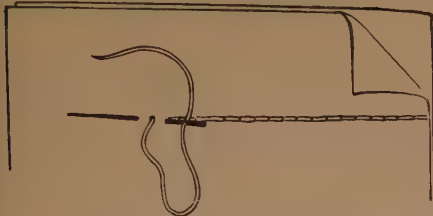


Fig. 7. Stitch This Way.

seam and flatten it on wrong side with thumb nail as in Fig. 10.

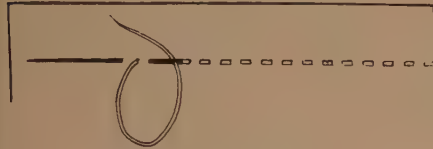


Fig. 8. Back Stitch.

Overcasting is almost the same as overhanding except that the stitches

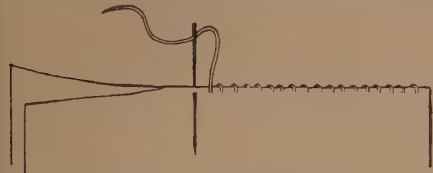


Fig. 9. Overhand Stitch.

slant, are farther apart, are taken deeper and the seam left closed as in Fig. 11.

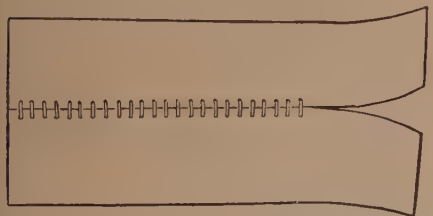


Fig. 10. Flatten Out Overhanding Like This



Fig. 11. This is the Way to Overcast.

Hemming. Use a card cut like (A) in Fig. 12, for measuring hem width and keeping it even. Turn in the

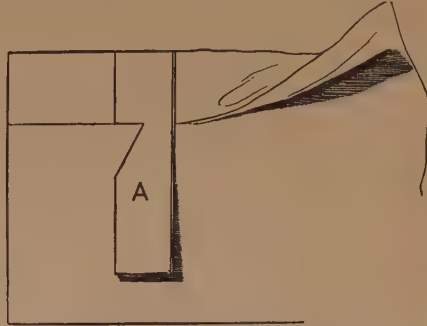


Fig. 12. Measure Your Hem to Keep It Same Width.

raw edge, Fig. 13a, again turn, Fig. 13b. Sew over finger of left

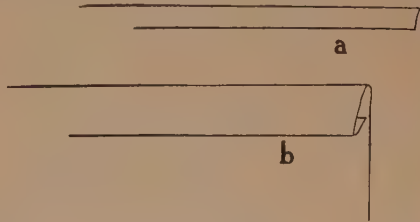


Fig. 13. (a) First Turn-down for Hem. (b) Second Turn-down for Hem.

hand for narrow hem, Fig. 14.

The rolled hem is for sheer material. Begin to roll the edge at right hand corner of goods, holding the edge between thumb and first finger of left hand; then with right thumb and slightly dampened first finger roll the hem, Fig. 15.

In making a French seam baste edges of goods together, and sew with three running stitches and one backstitch. Repeat until the seam is finished as in Fig. 16.

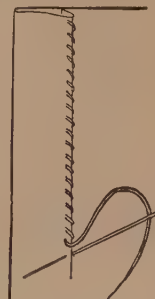


Fig. 14. Common Hemming.



Fig. 15. Rolled Hem.

Open the raw material, turn the sides over the seam, crease close on



Fig. 16. Edges of French Hem Sewed Together.

both sides of seam, and again sew with first seam inside as in Fig. 17.

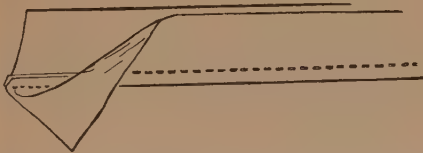


Fig. 17. French Hem, Showing Inside.

In felling baste seam with one edge lower than the other, as in Fig. 18. Back stitch edges together, turn

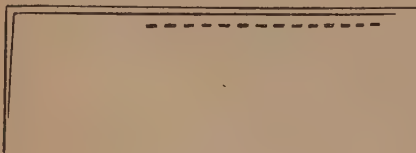


Fig. 18.

upper edge down over lower, crease it, open the material so the fell lies flat, then crease it down and hem,

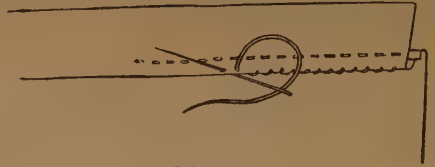


Fig. 19.

using needle when necessary to push edge under fell, as in Fig. 19.

This is the way to make buttonholes. Cut the hole evenly through both layers of cloth and make it fit



Fig. 20.

your button, overcast the edges or hold them together with a running stitch, Fig. 20. For strength, bar



Fig. 21.

corner, also the side, with several threads as in Fig. 21. Make the buttonhole stitches cover the bars of thread.

Begin to work on left corner edge of slit 1-16 in. from edge, and before

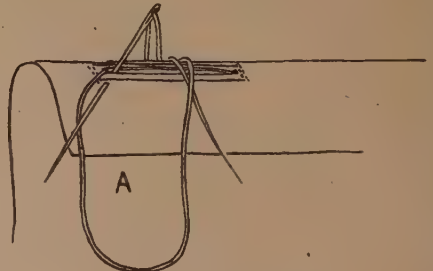


Fig. 22. Buttonhole.

pulling the needle entirely through, carry the thread around to the left and under the needle, then draw the needle through the loop A, Fig. 22. Continue in the same way until the buttonhole is finished as shown in Fig. 23.

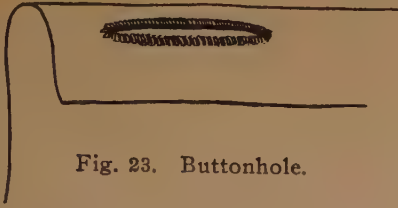


Fig. 23. Buttonhole.

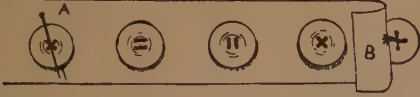


Fig. 26. Correct way to sew on button.



Fig. 24. Take stitch on right side of cloth before sewing on button.

Fig. 25. Then thread on button.

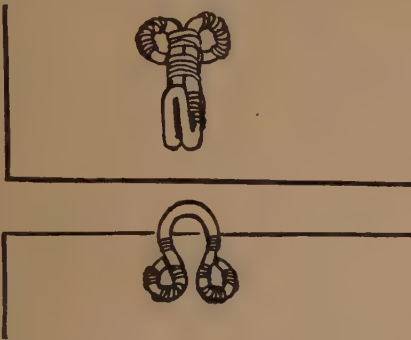


Fig. 27. Sew hooks and eyes on so that they will never drop off.

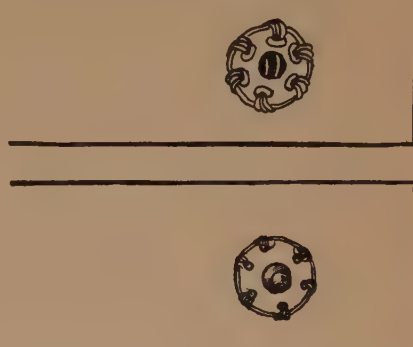


Fig. 28. Dress snaps need careful, firm and strong stitches to hold them tight.

Buttons. Figures 24, 25 and 26, explain sewing on buttons correctly.

First take a stitch on the right side of cloth where you want your button, Fig. 24; then thread your button, Fig. 25. Sew over a pin,

Dress Snap Fasteners must be sewed on strong and tight, as shown in Fig. 28.

Mending. When material is figured or striped, cut patch to match design. Fig. 29 shows a hole in

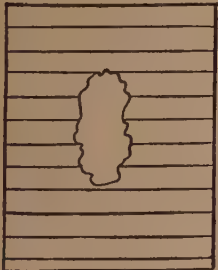


Fig. 29

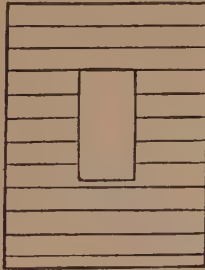


Fig. 30

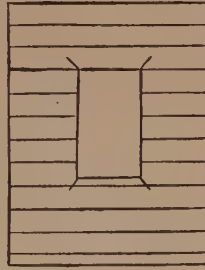


Fig. 31

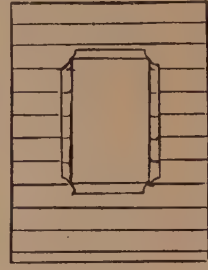


Fig. 32

Fig. 26, A, to make stitches loose for winding with thread between button and cloth, Fig. 26, B.

Fig. 27 explains how to sew hooks and eyes.

striped cloth, Fig. 30, the ragged edges cut straight. Fig. 31 shows the $\frac{1}{4}$ inch bias cut in corners. Fig. 32 tells how to turn down these flaps; then the patch can be placed over

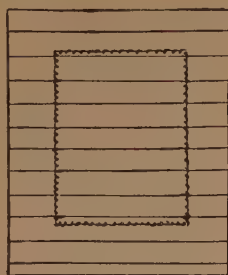


Fig. 33.

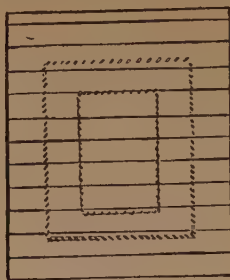


Fig. 34.

flaps and hemmed to goods, Fig. 33. Fig. 34 gives right side of material with the turned in edges of hole hemmed on patch.

Mending With Net

Worn places in embroidery, lace, etc., need net to strengthen the darn.

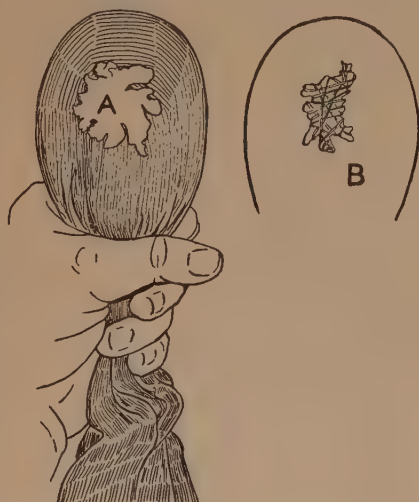


Fig. 36. Stocking ready for mending.

Baste the net on the wrong side of goods over spot to be mended; darn through both material and net. Then whip edges of net to goods. Fig. 35 gives wrong side before edges are whipped.

In darning a stocking slip the stocking over an egg, Fig. 36 A, then with needle and thread, draw edges of hole closer together, Fig.



Fig. 35. Darn strengthened and reinforced with net.

36 B. Begin darning $\frac{1}{2}$ in. from the hole, using cotton of same color as stocking. Work with running stitch, straight across and $\frac{1}{2}$ in. on the other side of hole; leave a loop of the cotton at the end of each line, Fig. 37. Darn across the first threads and when reaching the hole,

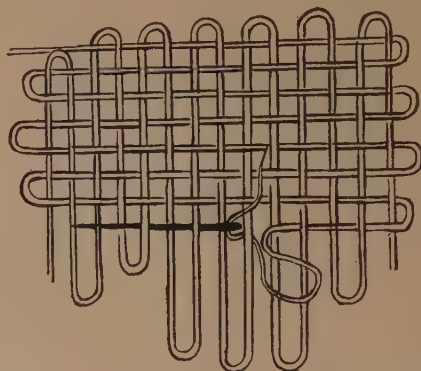


Fig. 37. This is the way to weave when darning.

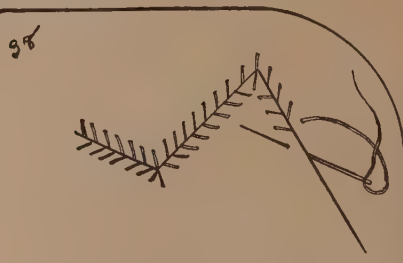


Fig. 38. Basting tear edges together ready for darning.

weave the cotton over and under. Fig. 37 is wide spaced to show how to weave.

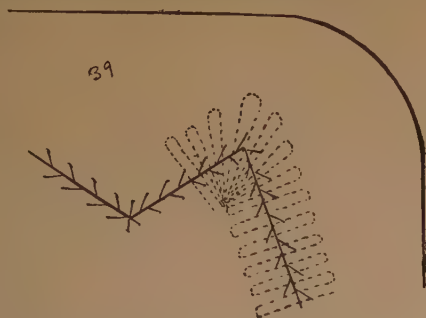


Fig. 39. Darning tear with running stitch.

In darning a tear draw the edges smoothly together by taking one basting stitch on one side of the tear, then one on the other, passing the needle through the open slit of tear for each stitch, Fig. 38.

Then darn with running stitch, leaving loop at each turn, Fig. 39, and carefully remove basting.



Fig. 40. Glove mended with rows of buttonhole stitches.

For a rent in a glove, buttonhole around edge of opening, and continue making rows until the opening is filled, as in Fig. 40.

Big and Little Things

*I cannot do the big things
That I should like to do,
To make the earth forever fair,
The sky forever blue.*

*But I can do the small things
That help to make it sweet;
Tho' clouds arise and fill the skies
And tempests beat.*

*I cannot stay the raindrops
That tumble from the skies;
But I can wipe the tears away
From baby's pretty eyes.*

*I cannot stay the storm clouds,
Or drive them from their place;
But I can clear the clouds away
From brother's troubled face.*

*I cannot make the corn grow,
Or work upon the land;
But I can put new strength and will
In father's busy hand.*

*I cannot stay the east wind,
Or thaw its icy smart;
But I can keep a corner warm
In mother's loving heart.*

ALFRED H. MILES

"The Piano Lesson"



© *Times Wide World Photos*

The original of this beautiful painting, which is the work of Jules Alexis Muenier, noted French Artist, hangs in the Luxembourg Galleries in Paris.

LESSONS AT HOME AND AT SCHOOL MUSIC

Learning to Play the Piano



Taking a Piano Lesson

You see these children from the Horner Conservatory of Kansas City learning their first notes and pieces on a keyboard placed on the table. They like taking piano in classes so well that they beg to stay on, even after they are ready for a private teacher.

HAVE you ever been to Ellis Island where the immigrant boys and girls from all over the world land? Each speaks a different language, and if it were not for the government interpreters, many of them would be helpless.

There is only one language that all have in common—the language

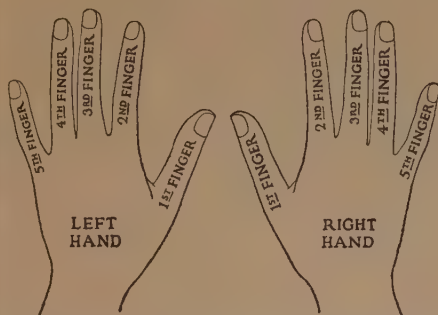
of music. For this reason it is called the Universal Language. You know our language is made up of ideas, which we call words and sentences. The language of music is made up of ideas, too, but we call it figures, motives and phrases.

*Music the
Universal
Language*



People have always loved music and appreciated its value and beauty; but the old fashioned methods of teaching music made it so hard for young beginners to understand that many of them lacked the courage to begin, while others who did, soon became discouraged and wanted to quit.

Counting Our Fingers



Since we call our thumbs our first fingers, we will put up our hands and count them aloud to get used to the numbers.

How happy I am to tell you that today these old fashioned ways of teaching music are as out of date as your grandmother's dresses. This is a wonderful age in which we are living. Just as we have newer and better ways of learning our other school subjects, so we have of learning music. It has at last been made interesting and more like play. Instead of the old time drudgery, the new way is so simple that even a small child can learn and enjoy it.

Old Methods of Teaching as Out of Date as Grandmother's Dresses

Class Piano

Children like music dressed up in the latest styles so much that they all want to take, and our big city schools are teaching beginners together in large classes, calling it Class Piano Teaching. Now I am going to tell you the way they do it because it is so delightful that you can easily learn it

by yourself, or call in your friends and play the game together.

How many of you know that in playing the piano we do not have any thumbs? On each hand we have five fingers, but we call our thumb our first finger, and next our second finger, the next our third, the next our fourth and our little finger our fifth.

Let's put both hands up and count our fingers aloud, beginning with the first finger (the thumb).

Hand Position

Now that we know the number of these fingers, you are ready to learn how to hold them. It is very important to do this exactly as I tell you because if you are careless and hold them right one time and wrong the next you can never get very far in Piano; and besides, it will be so hard if you do not hold them right in the beginning. It is much easier and a great deal more fun to begin right.

Imagine a large soft ball and try putting your hands on the keys as though over this ball, with the fingers nicely curved and slanted a little toward the first finger (the thumb), just as in the picture.

Correct Finger Position



Be sure to hold the fingers apart like this so the little chickens will not get mashed and the first finger on the side.

Let us play that our hands are chicken coops and we have to hold the fingers apart so that the chickens can go in and out.

If you hold them too close together, the chickens could not get any fresh air and they might smother to death! If you hold the middle of the hand too low down, you would smash the poor little chickens, and perhaps kill them. Surely no one would want to do that!

Did you know that nature has given you a little cushion just below each finger nail? She has given us these to press the keys with, in order that we may make lovely, soft tones, but we press the first finger on the side instead. Now see if you can do it.

Arm Weight

Imagine you have heavy hands. Now raise them above the table (or keyboard), from which you are sitting slightly back, letting them hang loose

*How to
Have Good
Tone and
Loose Wrist*

from the wrist. Then drop to the table, letting all the weight go into the fingers. This makes a good tone and a loose wrist, both of which are very necessary in playing the piano well. Many of us were not taught this when we began studying music and later on had to be put back, losing much time. I want you to learn music easily and quickly and not have anything to unlearn.

Quarter and Half Notes

A quarter note equals one beat. In the following exercise you will see two quarter notes in each group, or measure. Therefore, there are two beats in each group, or measure.

A Group, or Measure



There are two quarter notes, or beats, in each measure. A double bar shows that the exercise is finished.

Music is divided into measures by bars, which are straight lines drawn vertically down the staff.

This is called the clef sign.

Just after the clef sign in the above measure you see a $\frac{2}{4}$; the 2 tells how many beats in each measure and the 4 tells the kind of note that gets one beat. Here, you see, it is a quarter note.

*How to
Get Rhythm*

The $\frac{2}{4}$ is called the measure signature. Clap your hand for every beat in the exercise above. That would make eight times, would it not? But you do not count eight because the measure signature tells us to count two and so when we clap our hands we count, one-two, one-two, one-two, making the one louder than the two each time. This clapping to music develops rhythm.

Now, suppose you take a red apple and divide it into two parts. You would call each part a half, would you not? In piano we have half notes, too, which look like this:

Half Notes



When we divide an apple in two parts we call each part a half, so when we divide a note in two parts each part is a half note.

A half an apple is twice as large as a quarter of an apple. Since we give one beat to a quarter of an apple, we give two beats to a half, then to play a half note you have to hold it two beats.

The Keyboard as It



This is the picture of the keyboard on the piano. On it you will see groups of two and three black keys. Just to the left of the groups of two black keys is white key and this white key is our "do" or "C."

Quarter Notes



When each half of an apple is divided in two parts we call it a quarter. When half notes are divided into two parts we call each a quarter note, just as in this picture.

Now see if you can clap quarter and half notes together, remembering to hold the half note while you count two beats.

A Measure Showing Half and Quarter Notes



Clap once for the quarter notes and twice for the half notes. This clapping develops rhythm, the "go" of music.

Did you ever stop to think that there is rhythm everywhere? In our heart beats, the rustling of the leaves, the marching of the soldiers, etc.

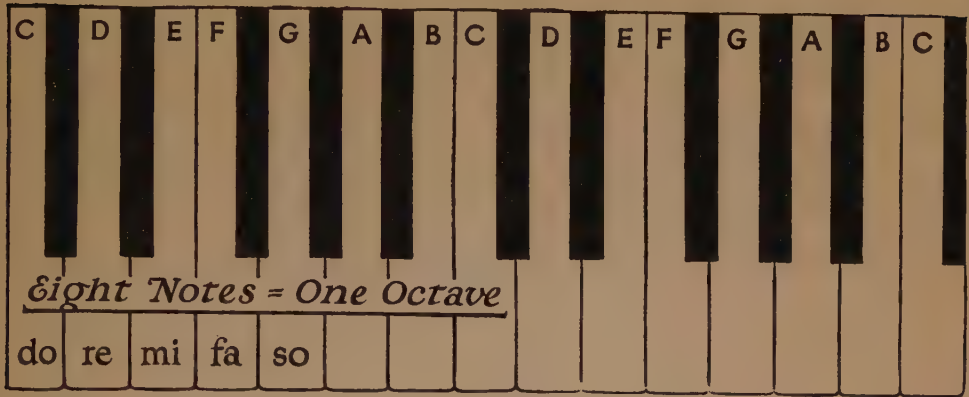
The Keyboard

Now you are ready to understand the keyboard, and the first thing you know, you will be playing a piece! Why, when mother was a girl, it would have taken her many weeks to have done that well. You did not know it could be so easy, did you?

With your left hand find the C or "do" below the C or "do" you have just played and put your fifth finger on it, your fourth on the key right after that (re), your third on the next key (mi), your second on the next (fa) and your first on the next (so). Play do, re, mi, fa, so, with your left hand.

How glad everybody must be to see that the third phrase is just like the

Looks on Your Piano



On C by the center group of two black keys put the first finger of your right hand. Call your first finger "do"; your second "re"; your third "mi"; your fourth "fa," and your fifth "so." Now play do, re, mi, fa, so with your right hand.

Now You Are Actually Ready to Play This Little Piece!

Notice the measure signature 2/4; also, the half note in the fourth measure. Read rhythmically and clap hands to the first four measures or phrases, remembering to hold the half notes two beats. Then place the right hand on do, re, mi, fa, so, as though keeping the hand over a ball. Now play and sign syllables (do, re, mi, fa, so) to the first four measures or phrases. Do the other three phrases the same way.

first one! Isn't it wonderful to be able to play the right hand already? I am sure you are anxious to start on the left hand, in order that you may be able to play the entire piece.

With your left hand find do, re, mi, fa, so. How you are wondering what those funny three-story notes are. This means to strike all three of them at the same time. When we strike more than one note at a time, we call it a chord. The first chord in your piece is the I chord or "do, mi, so," and is played with the 5th, 3rd and 1st fingers. Practice playing this chord until you can play it perfectly, remembering to keep your wrist loose and the fingers well curved. When you learn this first chord, you will notice that all the chords in the first four measures are just alike, so you are now ready to learn the chords in the second measure, or phrase. Did you have any idea you could do it so fast? You will notice the chord changes here. Hold fingers of your left hand over "do, re, fa, so," fa is just below "so," then put your second finger on "fa." "Ti" is just below "do," so slide your fifth finger down to "ti." Now play all three of these notes together, ti, fa, so.

Instead of calling this the "ti, fa, so" chord, we will call it the V_7 chord. Practice playing this chord until you can play it perfectly. What does the chord in the next measure look like? Your V_7 chord, doesn't it? Did you ever see the next chord? You will say, "Yes, that is the first chord we learned," the I chord. It is just like meeting an old friend again! In how many measures do you find this same chord? Six, do you not? Then the next two chords are what kind? V_7 . Our next? I. You did not know it could be so interesting and simple, did you?

When you learn the one chord, the V_7 chord, you know all the left-hand except the second to the last chord, which is the IV chord, or "do, fa, la." What finger played "do"? Fifth, did it not? Your second finger "fa," and "la" is right after "so," then slide your first finger up to "la." That's easy, isn't it?

If you will practice the chords in this order: I (so, mi, do), IV (la, fa, do), V_7 (so, fa, ti), I (so, mi, do) until you can go from one to another without any trouble, then when you put both hands together it will be easy.

What kind of notes are the chords? Half notes, except the ones in the second to the last measure. Who remembers how many beats the half note gets? I do believe there is not a soul who would not say two! Who can tell what kind of notes the chords are, in the next to the last measure? "Quarter notes"—that's fine! A quarter note gets one beat, does it not? Practice playing the chords in the last two measures—I, IV, I—remembering that they go twice as fast as the half note chords.

Then when you know and can play all the chords in the left hand, you are ready to put both hands together.

Can you realize that you will soon be able to play a piece? It will help you if, before attempting to play both hands together, you will put both hands on a table and clap (on the table) twice with the right hand to once with the left hand. (Clap both hands together, holding the left hand down while you clap the right hand again.) Do this many times.

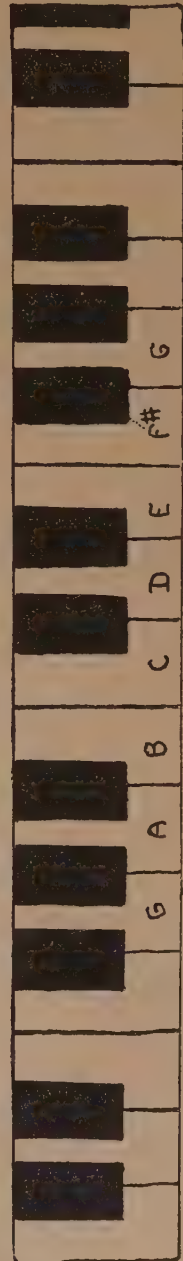
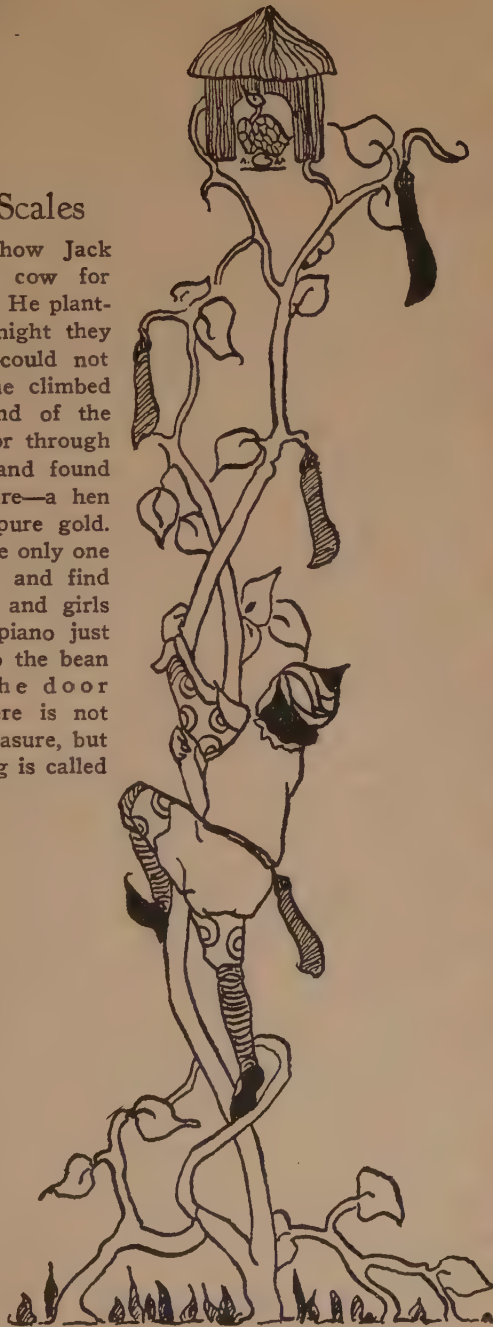
*Interesting
and Simple.
Just Like Play*

*The New
Way of
Learning to
Play a Piece
So Quickly
Keeps One
Interested and
Eager for
More Lessons*



Explaining Scales

You remember how Jack sold his mother's cow for three bean seeds? He planted these and overnight they grew so high he could not see the top, but he climbed up, and at the end of the vine, he saw a door through which he entered and found a wonderful treasure—a hen who laid eggs of pure gold. Now, Jack is not the only one who can climb up and find treasures, for boys and girls can climb on the piano just as Jack climbed up the bean stalk, finding the door through which there is not only one golden treasure, but many. This climbing is called scales.



MARY WATSON.

Playing the Piece

Now you can begin playing your piece. Put both hands in position as though over a ball; then play I or "do" with the right hand, with the I chord, do, mi, so, with the left hand, holding the chord down while you play "re" with the right hand. Practice this over and over until you are sure of it. Practice the rest of the piece the same way (by measures), remembering to hold the half notes in the last measure of each phrase two beats.

Doesn't it give you a thrill of pride to be able to play a whole piece all by yourself? Now I am going to tell you a secret that will thrill you even more! I am going to teach you something that was not taught to me until I had studied music ten long years and was too far advanced to need it very much. How much pleasure it would have given me to have known this from the beginning!

My father has a wonderful garden and early every spring he plants tomato and other seeds in little boxes and later on transplants them in rows into the garden. How many of you have seen this done? Perhaps you have even done it yourself.

Now, I am going to teach you to do in music just what you can do to the tomatoes—transplant this same piece to some other place on the piano! Won't that be wonderful? This will not only make you feel as if you have accomplished a great deal, but will establish the keys in your mind as nothing else will. Before transplanting this piece there is something else you must learn, and this reminds me of the story of Jack and the Beanstalk.

*Transplanting
Pieces Not
Only Gives
You a Thrill
of Pride But
Establishes the
Keys in Your
Mind as
Nothing Else
Does*

We are going to start with the C scale because it is the only scale played just on the white keys.

*Finding the
Golden
Treasure*

All scales must sound like C scale, and in order to do this, we have to play black keys sometimes. Imagine you are going up the bean vine like Jack, and the black keys are beans. The C scale vine was so near the bottom that it did not have any beans on it; but as you climb higher, you will find more and more beans. Won't it be fun looking for them? On our very next climb we will begin to see them.

Count up five keys from C (C, D, E, F, G) and start another scale on this new key—G. We call this G Scale. Who found the bean in this scale? Where was it? Yes, it was on "ti."

In order for you to reach the top of the vine, follow the route that I shall give you, otherwise you might get lost. Start on the note that I give you at the beginning of each scale. Now, all the notes with lines under them represent black keys or beans, so when you come to one of these, be sure and play the black key that is just above the white key. We call this a Sharp (#).

After playing each scale, play the chord of that scale. Practice the chords as I told you to do the Arm Weight.

*All Notes in
Bold Type
Represent
Black Keys
or Beans.*

I, IV, V₇, I, hands separately.

(C)

(C) Scale do, re, mi, fa, so, la, ti, do
CHORDS I —do, mi, so

IV —do, fa, la

V₇ —ti, fa, so

I —do, mi, so

(G)

(G) Scale do, re, mi, fa, so, la, ti, do
CHORDS I —do, mi, so

IV —do, fa, la

V₇ —ti, fa, so

I —do, mi, so

(D)

(D) Scale do, re, **mi**, fa, so, la, **ti**, do

CHORDS I —do, **mi**, so

IV —do, fa, la

V₇ —**ti**, fa, so

I —do, **mi**, so

(A)

(A) Scale do, re, **mi**, fa, so, la, **ti**, do

CHORDS I —do, **mi**, so

IV —do, fa, la

V₇ —**ti**, fa, so

I —do, **mi**, so

(E)

(E) Scale do, **re**, **mi**, fa, so, la, **ti**, do

CHORDS I —do, **mi**, so

IV —do, fa, la

V₇ —**ti**, fa, so

I —do, **mi**, so

(B)

(B) Scale do, **re**, **mi**, fa, so, la, **ti**, do

CHORDS I —do, **mi**, so

IV —do, fa, la

V₇ —**ti**, fa, so

I —do, **mi**, so

(F)

(F) Scale do, re, **mi**, **fa**, so, la, **ti**, do

(This **bean** or "**fa**" is played on the black key just below, instead of above. When we lower a note this way it is called a flat (**b**). Think of a flat tire. When a tire is flat it is down, and so it is with a flat on the piano.)

CHORDS I —do, **mi**, so

IV —do, **fa**, la

V₇ —**ti**, **fa**, so

I —do, **mi**, so

Remember that "Practice makes perfect," and it, also, makes things easier! If you stop right here and practice these scales and chords until you know them perfectly, you will

find your climbing easy. Otherwise, you might lose your balance and fall.

Later on you will want to climb higher (take the rest of the scales, those starting on black keys); but

first, let us explore the treasures already at hand. The first of these is the ability to play, or transplant,, your piece to any key.

First, play your piece over just as it is written, in the key of C. Now, for a little transplanting! Instead of C, put your "do" (first finger of right hand) on G; "re," or second, on the next key, and so on with the rest of the fingers.

We Learn so Play a Piece in Any Key. How Easy It Is, and Yet, Under the Old Way, It Took Many Years to Learn.

Then put your "do," "re," "mi," "fa," "so" fingers of left hand on the keys, eight notes (an octave) below the right hand. There are two things to remember in transplanting pieces: First, to always keep your hands on these keys, and, second, to keep in mind where the black keys come. If you do this, you will find transplanting easy.

Now, you are ready to play your piece! See how easy it is when you have mastered each step? I would advise you not to try to transplant but one key a day and spend the rest of your time learning the notes I am going to tell you about at the end of the lesson.

Suppose this morning we play the piece in the key of D. Put your "do," "re," "mi," "fa," "so" fingers in both hands on D, then play it as before. Now, let's see if you can transplant this piece in the rest of the keys—A, E, B and F—remembering to do one of them a day.

Transplanting One Key a Day, Spending Some Time on Notes at the End of the Lesson.

Now you can actually do something that has taken most people many years to learn. We call this transplanting "transposition," which just means playing a piece in another place.

We come now to the last great treasure, we shall explore together; but I hope you will be so interested and inspired by the ones *The Last Great Treasure* we have already found that you will want to go on and on. There is no limit to the treasures you can find if you will but seek diligently.

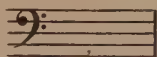
Remember how, when you first went to school, you were taught to read by words, and it was not until after you learned to read that way that you gradually learned the letters? Do you realize that you are learning music in exactly the same way? You have learned to play a piece by syllables in seven different keys, seven scales and the chords, I, IV, and V₇, to each one, something of rhythm, correct hand position, etc., and now you are ready to learn the notes.

Learning Our Notes

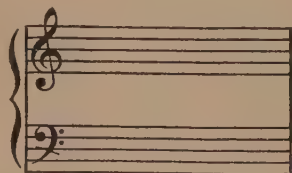
A staff is five lines with a space between each line, a space above and a space below. Now when I draw the treble or G clef sign on the staff it is



called the treble staff. The treble staff is usually played with the right hand. Say this (treble staff) many times. When I draw the bass or F clef sign on the staff it is called the bass staff. The bass staff, which looks like this,

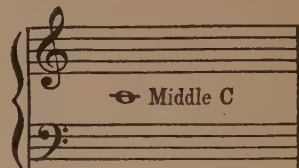


is usually played with the left hand. Say "bass staff" many times.

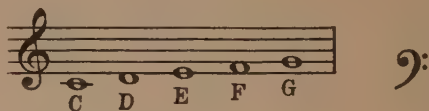


When I join these staves (treble and bass) with a straight line and a brace, it is called a Grand Staff, because it is a truly great big staff.

A long time ago there used to be eleven lines, with a middle connecting treble and bass, but this was so hard to read that all the middle line was done away with except just enough to put a note on and this note is called middle C because it is in the middle of the Grand Staff, just as in the following picture:



Then the first "do" you learn has another name, middle C. What note comes right after C? "D," does it not? "D" is played on the white key right after "C." "E" is played on the next white key; "F" on the next white key, and "G" on the next.



Practice saying:

E is on the first treble line.

G is on the second treble line.

F is on the first treble space.

D is on the first added space below the treble staff.

Middle C is on the first added line below the treble staff.

Have someone put this down while you close your eyes, then you open them and see if you can read the notes and also tell where on the piano they are played. This is very important. When you know these, you are ready to learn some more.

Middle C is not written right in the middle of the Grand Staff. When C

is played with the right hand it is the second note below the treble staff; when played with the left hand it is the second note above the bass staff. Middle C is written both ways, but it is the same note.

What note comes right after C? B, does it not? B is played on the key right below C; A on the key just below B, and G on the key below A. (There are just seven letters—A, B, C, D, E, F, G—in our musical alphabet, so when we get to G, we start all over with “A” again.)

Learn these bass notes as you did the treble ones.

All the notes are learned the same

way, so when you know the treble and bass notes I have given you, look at the notes written by your keyboard, and learn the rest of the notes, learning those on the Grand Staff first, before you take up the notes added above or below the staves. These notes are written so that you can tell the name of each note and where on the piano each is played.

After learning how to play a piano in any key and all of your notes, I trust you are so interested in piano that you will want to get a teacher right away and keep it up. If you are not able to hire a teacher, you can easily go further by yourself.



LESSONS AT HOME AND AT SCHOOL

WEAVING

Things to Weave



Courtesy F. H. Rindge.

THIS young Hopi Indian girl, sitting in the sun before her stone and brush hut (called a hogan), is just finishing a beautiful basket. Basket making is one of the very oldest, as well as one of the simplest of mechanical arts. The American Indians excel in it, and their baskets are as beautiful as any others in the world. All baskets may be divided into two classes, woven baskets and coil baskets; the Hopi girl in the picture has made a coil basket.

You can learn the art of basket-making, it is really very simple, and when your basket is

finished you will have something that is useful, and attractive as well—something that you may be justly proud of.

Basket reeds are graded and numbered according to size, the lower the number the more slender the reed, and as the number goes higher the reed is heavier and larger around. Reeds used for spokes of a basket should always be stronger and heavier than the weaving reeds. If you want a good sized basket, use long heavy reeds as spokes; for a small basket select short reeds of lighter weight. To make a basket like the one at the top of page 753,

How a Basket Grows

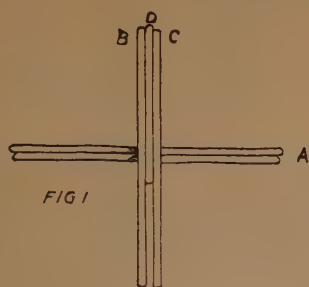


FIG. 1

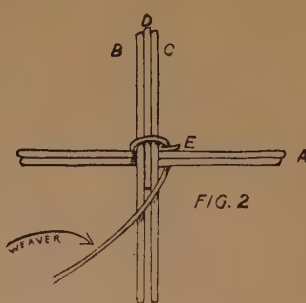


FIG. 2

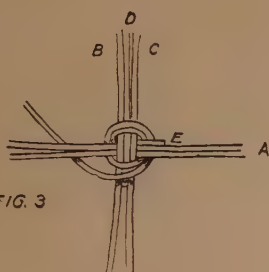


FIG. 3

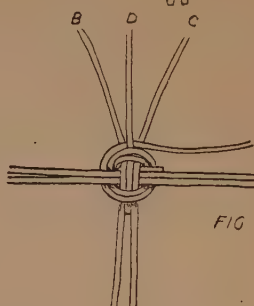


FIG. 4

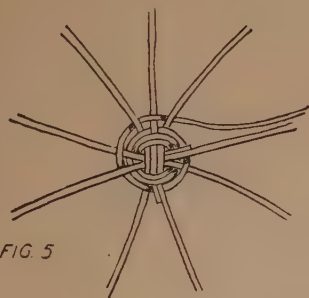


FIG. 5

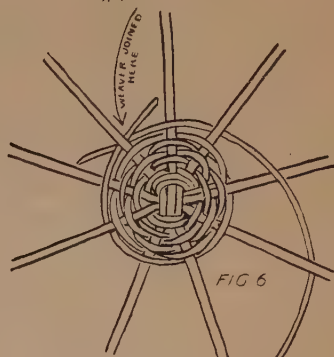


FIG. 6

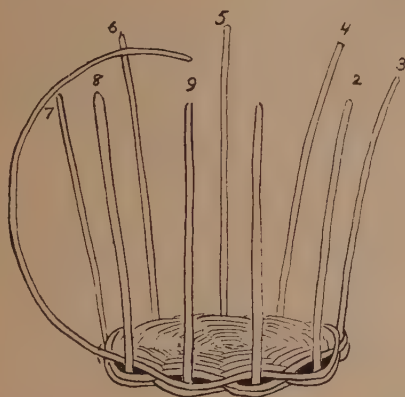


FIG. 7

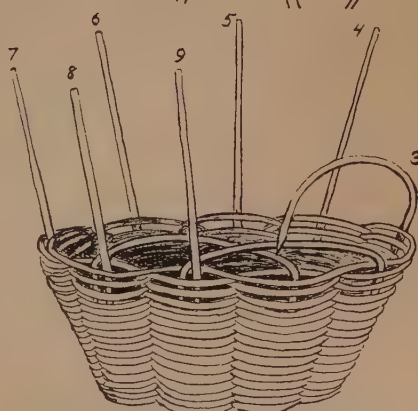


FIG. 8



FIG. 9

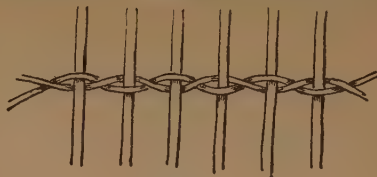


FIG. 11

cut four spokes of No. 3 reeds, each spoke 14 inches long. Cut one more spoke of No. 3 reeds, but make it only 8 inches long. Now from your bunch of

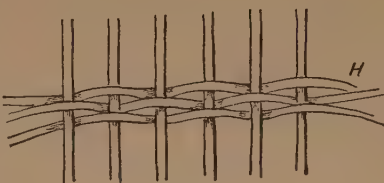


FIG. 10

No. 2 reeds draw out two strands. These two reeds are the "weavers." Coil each weaver into a circle about the size of a breakfast plate, and run the ends in and out the coil, to keep them from unrolling.

Soak all this material in cold water for about an hour. When pliable place two 14-inch spokes down flat, close together, side by side on a table or a board (*A* Fig. 1). Across the center of these lay two 14-inch spokes (*B* and *C* Fig. 1) and slide the 8-inch spoke *D* between *B* and *C*, Fig. 1. The end of *D* extends a little beyond the center.

Hold the five spokes firmly in position with your left hand while weaving with the right. Begin by fitting one end of the weaver under the three top spokes, and close to the two under spokes, with its extreme end pointing toward the right (*E* Fig. 2). Loop the long end of the weaver over the three spokes, *B*, *C*, *D*, where they meet the two cross reeds, flatten with your thumb and finger and bring the weaver down under its own end *E*, also under the two reeds (*A* Fig. 2). Next carry the weaver over the three spokes

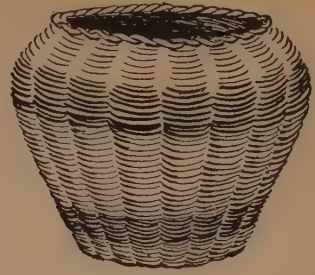
(Fig. 3) down under the two spokes, up and over the three, down and under its own end *E* and two spokes *A*, up over the three and down under the

two (Fig. 3). Now stop weaving a moment while you separate the three spokes *B*, *D*, *C* (Fig. 4). Then weave over, under and over these. Continue to separate all spokes as you reach them, and weave under and over (Fig. 5).

When a new weaver is needed join it on the last weaver by crossing their ends, as shown in Fig. 6. Hold the crossed ends steady with the left hand as you continue to weave.

As soon as the bottom of the basket is sufficiently large dampen the spokes, so that they bend easily, turn them up (Fig. 7) and keep on weaving until the sides are as high as you want them.

Finish the top of the basket by binding it off, with its own spokes. First cut off the extending ends of the spokes with a slanting cut, making them all the same length; hold them in water until pliable; then bend spoke No. 1 (Fig. 7) and run its point down into the opening made by spoke No. 8 (Fig. 8). Push spoke No. 2 into the weave by the side of spoke No. 9. Run spoke No. 3 down by the side of spoke No. 1 (Fig. 8). Bend down and slide in all the remaining spokes in like man-



Here are the Finished
Baskets



ner, and your basket will be finished.

Fig. 9 shows the simple weaving in and out with one reed *F*, and a number of spokes. Fig. 10 gives the same with the weave *H* above and the weave *G* below. Fig. 11 is the pairing weave, often called primitive

weave. In this two weavers are used at the same time and crossed between each spoke.

After you have had a little practice with the simple weave, you will be ready to try your skill in making experiments with the pairing weave.

Bead Weaving

Make your own bead loom of a smooth piece of wood about 12 x 3 inches or wider and $\frac{1}{4}$ -inch thick (Fig. 12). On top of each end fasten a small block of wood 1 inch high, $\frac{1}{4}$ -inch thick and 4 inches long. Tack these uprights in place with slender brads.

Carefully hammer in a row of slender, headless nails along the top edge of each upright *I* and *I* (Fig. 13), allowing the nails to go in only deep enough to hold firmly. Hammer also a large headed tack on the outside of each upright midway between the top and bottom (Fig. 13).

Use strong waxed linen thread for weaving. Tie the long threads all together at one end and call them the "warp." Always allow one more warp thread than your number of

beads in the width of belt or chain you intend to weave.

Fasten the knot of warp ends on the large headed tack (Fig. 13) and carry the threads over the top of the upright (Fig. 13), running them between the nails (Fig. 13 and Fig. 14). Stretch the threads across to the opposite upright between the nails (Fig. 13) and bring them down on the outside of the upright, where you must fasten them to the big-headed tack.

The warp threads may be as long as you wish. After stretching them across the loom and attaching them to the large tack, wind the extra length on a piece of paper and fasten it to the loom under the large-headed tack, ready to use when needed.

If you have 8 warp threads across



FIG. 12
STRIP OF WOOD FOR BOTTOM OF BEAD LOOM

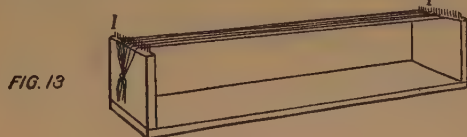


FIG. 13

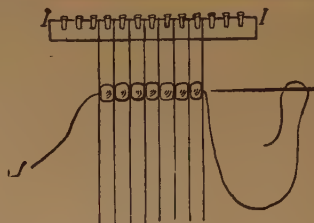


FIG. 14



FIG. 15

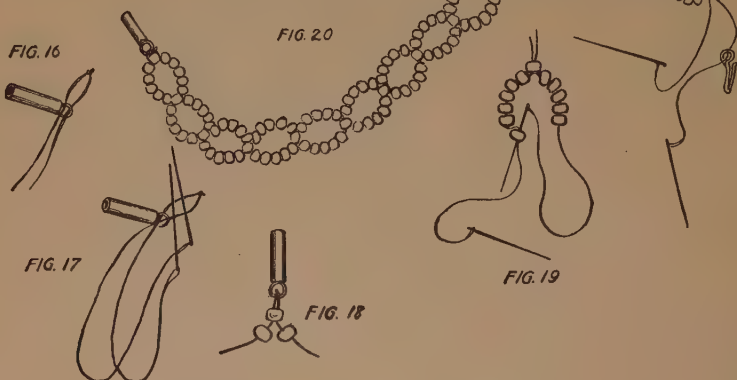


FIG. 16

FIG. 20

FIG. 17

FIG. 18

FIG. 19

the loom, string seven beads with needle and thread. This thread is your "weft." Warp runs lengthwise and weft goes crosswise.

Place these weft thread beads underneath the warp threads, adjusting the beads so that they can be pushed up between the warp threads and held up by a finger of the left hand (Fig. 14) while you bring the weft threaded needle back through the beads again, *on top* of the warp threads, and in this way sandwich the row of warp threads between two weft threads.

Tie the loose end of the weft I, Fig. 14, to the thread in the needle, and the first row of beads will be woven. String seven more beads and weave them as you did the first ones. Continue to repeat the process until the fob, belt or chain is finished.

Fig. 15 gives a portion of a woven bead belt made of white, red, yellow and black beads. The same pattern can be used for other colors.

With two threaded needles and good sized beads you can fashion a charming necklace. Choose beads of any color or colors you like, have ready a clasp (Fig. 16) and begin work.

Tie the ends of the double waxed thread in each needle together. Run this knot through the loop on one end of the clasp (Fig. 16) and pass the two needles through the extended thread loop (Fig. 17). Draw the knot tight on the metal loop, and thread both needles through the same bead. Then separate the needles, threading each through a different bead (Fig. 18). Run four more beads on each needle and again pass

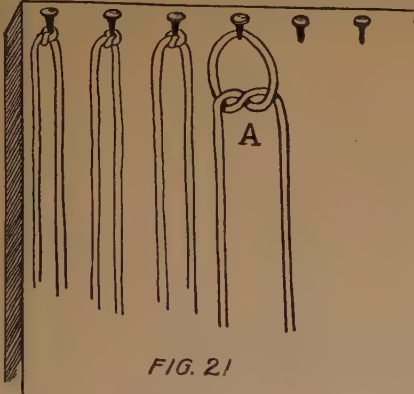


FIG. 21

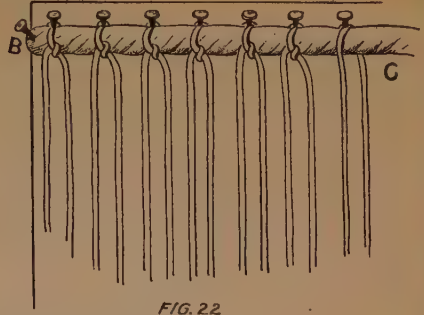


FIG. 22

the two needles through the same bead (Fig. 19) after which thread each separate needle with five beads and bring the beads together by running the two needles through the same bead. Keep on making these bead rings until the neckline is long enough. Finish by sewing on the catch half of the clasp (Fig. 20).

One word of caution: Always work with medium sized, or better still, large sized beads. Avoid the fine, small beads if you value your eyesight. Remember that good eyesight is worth more than all the beads in the city.

Weaving a Craft Portiere

Soft, loosely twisted mop rope and soft, coarse twine with some large glass beads of various colors are the materials you will need for your decorative, strong, substantial portiere.

Have ready an ordinary smooth board several inches longer than the width you want the portiere. On this rule a lead pencil line one inch from the top edge and reaching from

end to end of the board.

Drive a row of tacks along the pencil line $\frac{3}{4}$ inch apart, and on each tack tie the center of a long piece of soft twine. Have the twine vary in length that the joinings may not come in a

row, when more twine is added.

Fig. 21 shows a portion of the board with tacks in place and twine tied on the first three tacks. On the fourth tack (A) the twine is tied loosely, ready to be drawn tight; twine has not yet been fastened on the remaining tacks.

Fold in separately the loose ends of strands composing the mop rope end, and fasten them in place with strong needle and thread. Then begin weaving. Place the rope end up close to the first tack and hold it in position with an extra tack (B, Fig. 22) while you bring the rope across to the opposite end of the board, keeping it well up against the tacks. Draw the rope only tight enough to prevent sagging, and fasten it at the opposite end of the board with another tack. Then place the rope in between the two lengths of twine

FIG. 23

hanging from each tack. Tie the different strands of twine around the rope (Fig. 22). *C* (Fig. 22) gives the rope in place but not yet tied with the twine. Continue tying in the rope until the entire stretch of

rope is fastened between the twine. When the opposite end of the board is reached, bend the rope as at *D* (Fig. 23) and turn it back across the board, securing it with an extra tack, as shown in *D* (Fig. 23). Again

The Finished Portiere

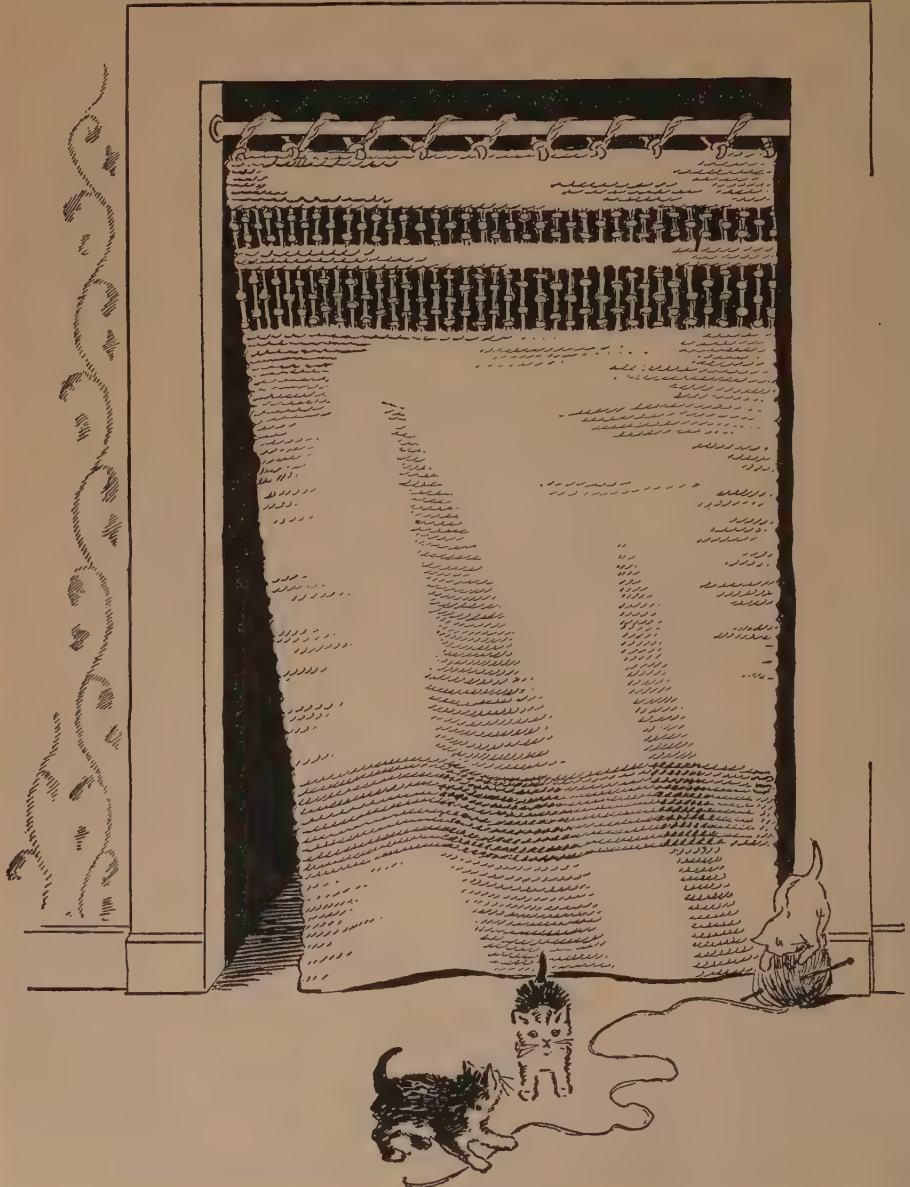


FIG. 25

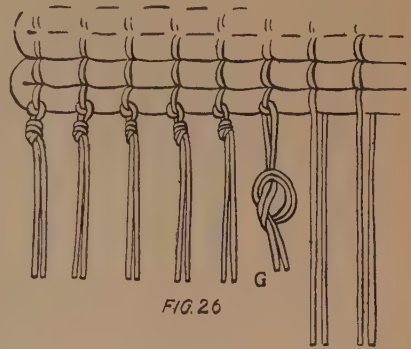
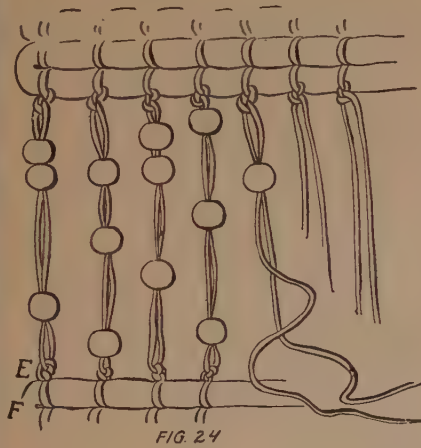
adjust the strands of twine over and under the rope and tie. As soon as the second row is tied make a third row (Fig. 23). Weave back and forth in this way, from end to end of the board to the depth of about 8 inches. Then instead of single knots make the last row of knots double—a "hard knot" or a "square knot."

Cut off the remaining rope and fasten the strands of the rope end with thread and needle. Your weave

solid rope band about $2\frac{1}{2}$ inches wide; next a bead band $5\frac{1}{2}$ inches, using several beads on each double twine. Keep the beads at irregular distances apart.

Fig. 24 shows four strands of beads as they should be when finished, the fifth double strand gives only the first bead in place, and the remaining strands are not yet beaded.

Weave solid rope band next and



is now ready for the beads. Moisten the two ends of the first piece of twine hanging from the first double knot, and with thumb and first finger, roll the two damp ends together into a sharp point, thread the point through a red bead, allowing $3\frac{1}{2}$ -inch length of the twine, then slide on a green bead and near the bottom another red one; tie the bottom ends of the twine into a double knot (E, Fig. 24). Have all the hanging twine $3\frac{1}{2}$ inches in length from the top knot to the bottom one.

String a green bead, a yellow one and a purple one on the next double twine. Keep stringing various colored beads in this way until the band of beads is finished. Then weave a

weave to depth you wish the length of your portiere.

Other kinds of soft rope or heavy cord may take the place of mop rope if desired, and the design varied by having a darker weave a short distance from the bottom (Fig. 25).

If fringe is needed on the bottom of the hanging, make it as in Fig. 26. Here G shows exactly how to tie the twine fringe. When finished trim off evenly.

As soon as the weave of the portiere is deep enough to reach to the bottom edge of your board, remove the tacks and shove the work up, bringing the greater portion of the finished weave over the top edge of the board, fasten again with tacks

The Portiere Loops

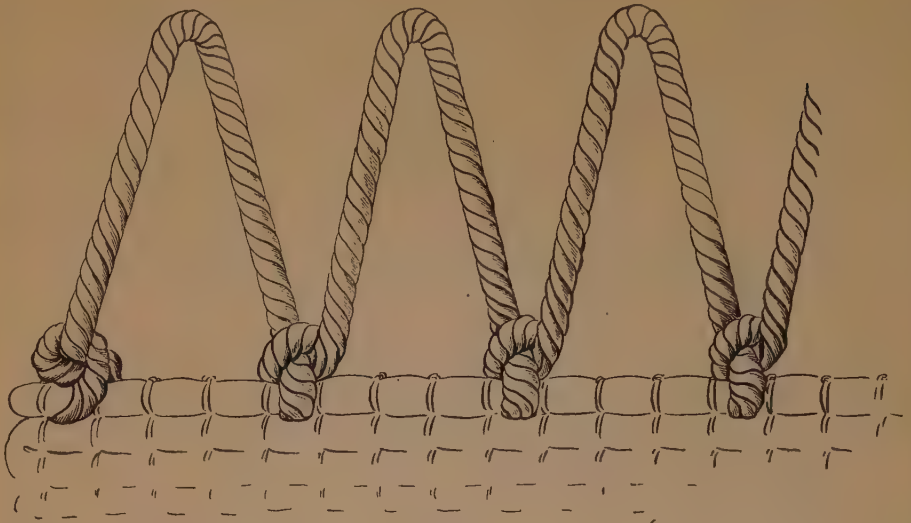


FIG 27

(only enough to hold it firm), while you continue the work.

Loops by which to hang the portiere are shown in Fig. 27. One end of a piece of rope is pushed through between the first and second weave and tied.

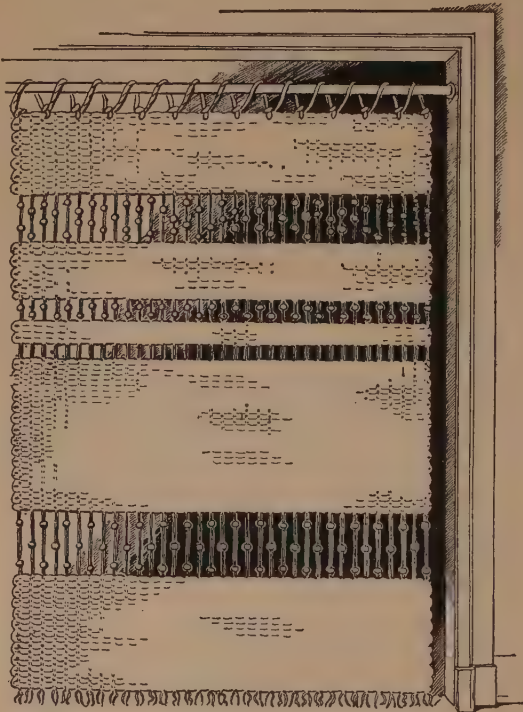


FIG 28

Then 3 inches from the first tie, again the rope goes between the weave; is tied after allowing a 10-inch length of rope for the loop. Fig. 28 gives the method of hanging the portiere by the loops.

How the Portiere Is Hung

LESSONS AT HOME AND AT SCHOOL

PAPER CUTTING

Things to Make of Paper



© Keystone View

ISN'T this a beautiful house the children in the picture have made? See the green crinkley grass, and the queer shaped tree? The star makes us think of Christmas!

There are so many, many fascinating things to be made of paper. Crepe and art paper comes in all the colors of the rainbow.

How would you like to make a canoe—one that would really float? Or a pretty basket to fill with dainty paper flowers? Get a sheet of paper and we'll begin with a canoe.

The Canoe

Trace a pattern for the boat, Fig. 1, on smooth paper. Fold the paper first, then mark an outline of the canoe on one side, Fig. 2. Cut it out, open, and you have Fig. 3. Lay this pattern flat on heavy white paper, run a pencil line around the edge, and cut it out. Paint the canoe to resemble birch bark and close the open ends by overhanding the edges of the sides together with color-

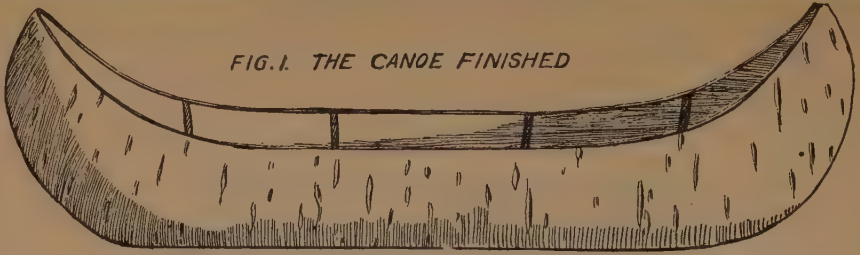


FIG. 1. THE CANOE FINISHED

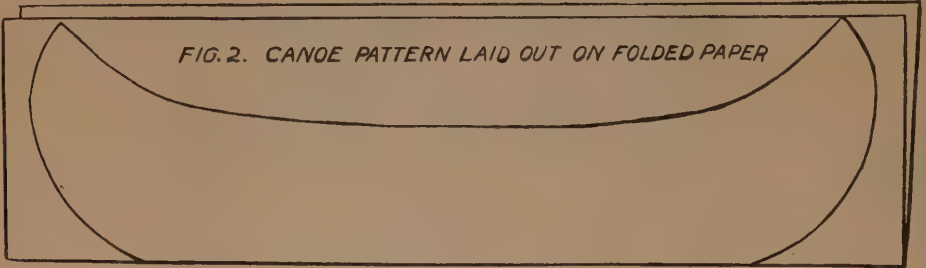


FIG. 2. CANOE PATTERN LAID OUT ON FOLDED PAPER

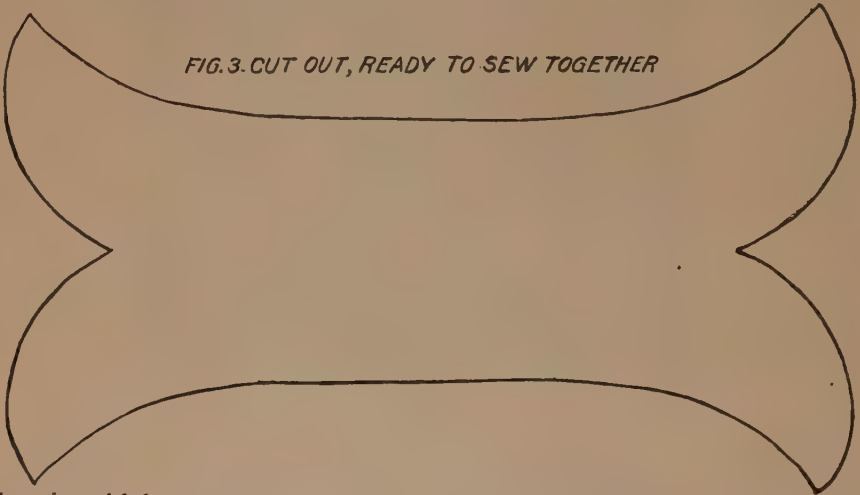


FIG. 3. CUT OUT, READY TO SEW TOGETHER

ed floss in widely separated stitches. Use blunt end wooden toothpicks as props to keep the central sides of the canoe apart.

Butterflies

You will want a number of these, and Fig. 4 gives the outline pattern on folded paper. Fig. 5 shows the butterfly cut out, and Fig. 6 gives it bent and ready for flight.

Suspend a group of these fairy-like creatures with fine black threads

of different lengths and not too close together, then watch them fly and flutter with every motion of the air. The butterflies are especially attractive made of smooth tissue paper of varying tints, and even though conventionalized in regard to color and the absence of characteristic markings, they are very effective.

Bird

Let the bird, Fig. 7, be of stiff paper. Fig. 8 is the pattern on

A Bird and a Butterfly



FIG. 5



FIG. 4



FIG. 6

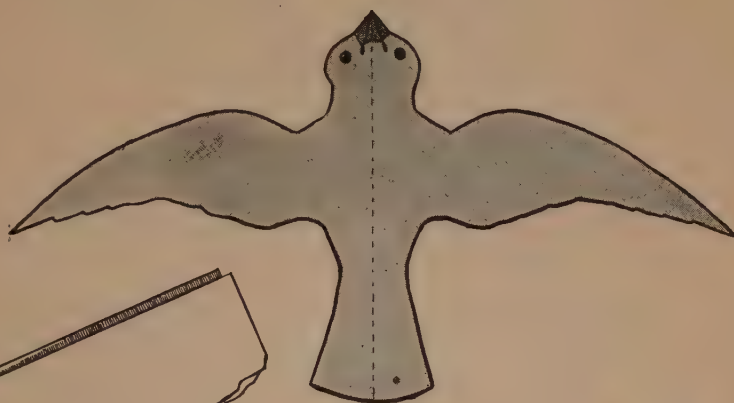


FIG. 8
YOUR CUT OUT BIRD
READY TO BEND INTO SHAPE

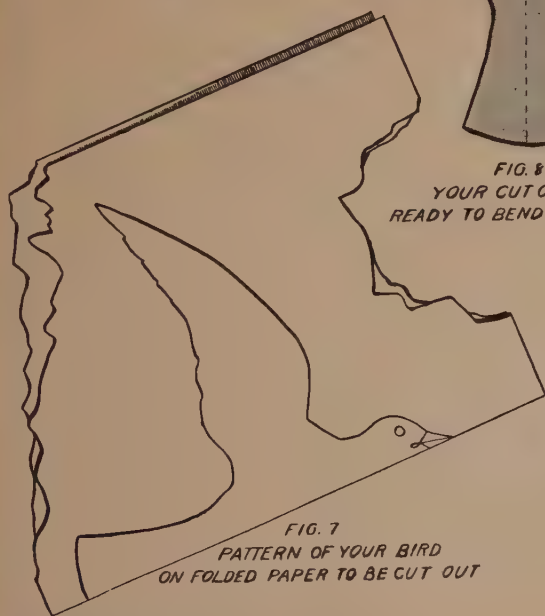


FIG. 7
PATTERN OF YOUR BIRD
ON FOLDED PAPER TO BE CUT OUT

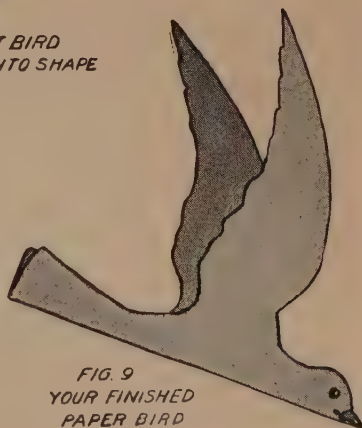


FIG. 9
YOUR FINISHED
PAPER BIRD

Making a Paper Rose



FIG. 11

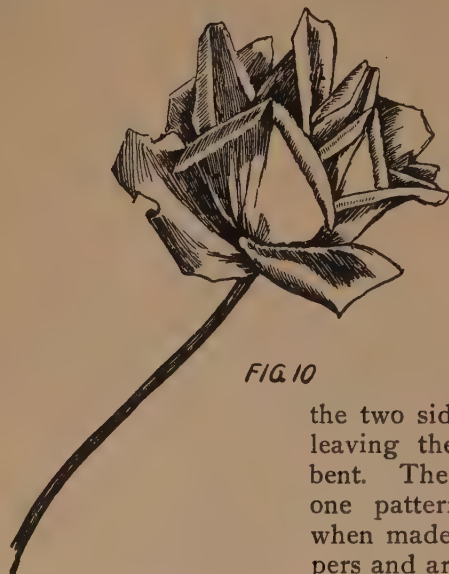


FIG. 10

folded paper, and Fig. 9 the bird cut out with beak and eyes marked, dotted line indicating where to bend the bird through the center. As this is a conventionalized bird it is not intended to represent any particular species, but it may be any kind you wish. A flock of blue birds, "for happiness," can be made of blue book-cover paper, and the same pattern with scarlet paper gives scarlet tanagers. Paint the wings and tails of the tanagers black. Many other varieties of wild birds may be made with different colored papers.

After bending each bird, paste

the two sides of the head together, leaving the body and tail merely bent. The birds, though all from one pattern, look entirely unlike when made of different colored papers and are very lifelike in appearance. They may be fastened on a natural branch, suspended in the air by threads, and can also be used as place cards.

A Paper Rose

The pretty, large-sized paper rose, Fig. 10, can be pink, white, red or yellow, and even variegated like our rare York and Lancaster rose.

Use heavy wire wound with green tissue paper for the stem, and form the rose petals of strips of smooth, slashed tissue paper, the slashes being $2\frac{1}{2}$ inches wide and $2\frac{1}{2}$ inches deep, Fig. 11A.

With the blade of a dinner knife curl the two top corners of every

A "Strawberry" Basket



Fig. 12

petal by drawing the petal between the knife blade and finger, Fig. 11B.

Wad tissue paper on the end of the wire stem, and on this as a foundation wind the rose petals around and around, gathering the bottom edge of the petal strip as you paste the petals in place.

Strawberry-Leaved Basket

A dainty little strawberry-leaved basket, Fig. 12, is just what you want for serving individual portions of fresh, unhulled strawberries or for candied strawberries.

Trace the pattern, Fig. 13, on stiff paper, cut it out, mark the veining of the leaves as in C, Fig. 13. Bend up sides and corners at dotted lines and with a stitch or two of thread fasten the corners of the basket together. Make this leaf basket of white paper and paint it light green, veining the leaves in a darker shade; or you can have it of green paper with leaf veining done in pen and ink.

The mayflower basket shown in Fig. 14 is an odd little affair;

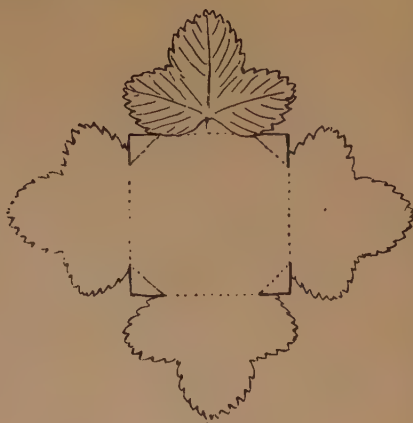


Fig. 13

make one for each place at the luncheon table; have them of any color you choose, but let the paper be substantial and stiff. The sides look well either plain or decorated. Cut the basket from pattern, Fig. 15, bending all dotted lines. Paste the lapping bottom together, do the same with the two sides, and give the basket time to dry before using.

Another mayflower basket, Fig. 16, is equally charming. Mark a 5-inch square of paper, like Fig. 17. Cut heavy lines and bend dotted lines. The four corners, marked J, form the shelving triangles at top of basket. Use flowered, smooth paper

Mayflower Basket



Fig. 14

in making these baskets, or white water color paper on which you can paint little rose-buds, powdered over the surface. Slide the ends of the handle, Fig. 18, in slits H and E, Fig. 17; this finishes the work.

Pattern for a Mayflower Basket

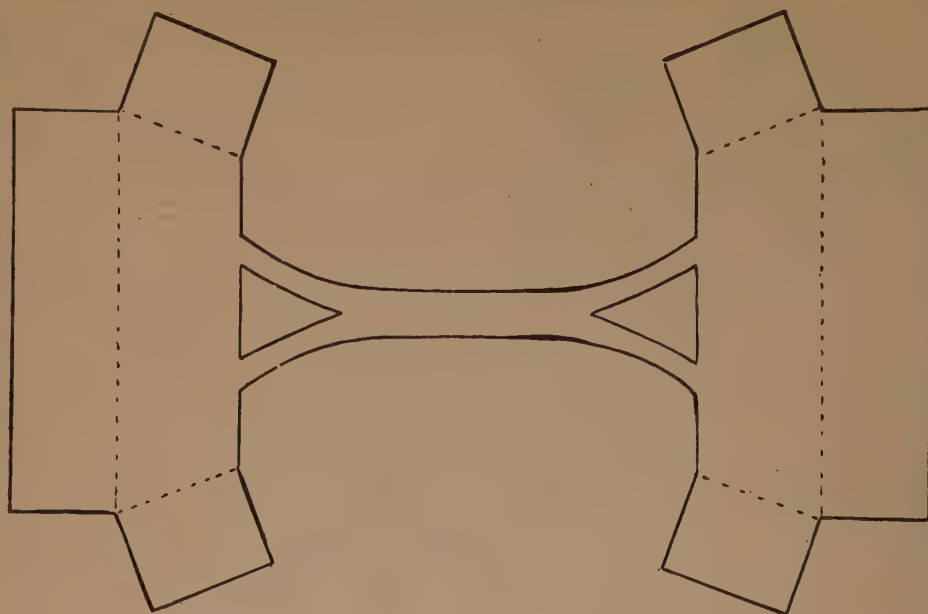


Fig. 15

A Paper Vase

The paper vase with classical lines, Fig. 19, must be of solid colored, stiff paper—bookcover paper is best—cut like the pattern, Fig. 20. Dotted lines indicate the laps at back of vase. Glue these together, then turn the handles over and fasten them down on the sides of the vase, as in Fig. 19. Cut a disk of paper $\frac{1}{4}$ inch larger than the circumference of the bottom edge of your vase. Slash the edge, Fig. 21; fit the

bottom on the vase and glue the slashes up on the outside of the vase. Cover with a strip of same paper.

You can make candle shades of paper that are as cheerful, pretty and attractive as those of silk or other material, and are inexpensive and easy to make.

You will need circular pieces of paper for a number of the shades, and by following directions given here, you can readily turn a square piece of paper into a circular one.

Take a 9-inch

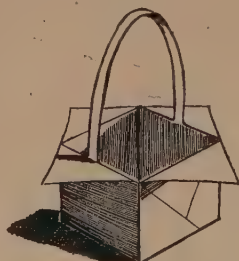


FIG. 16

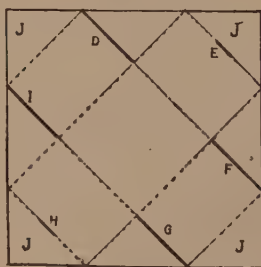


FIG. 17



For the Paper Vase

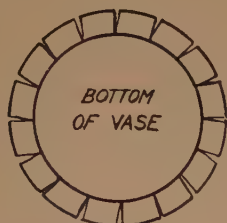


FIG. 21



FIG. 19

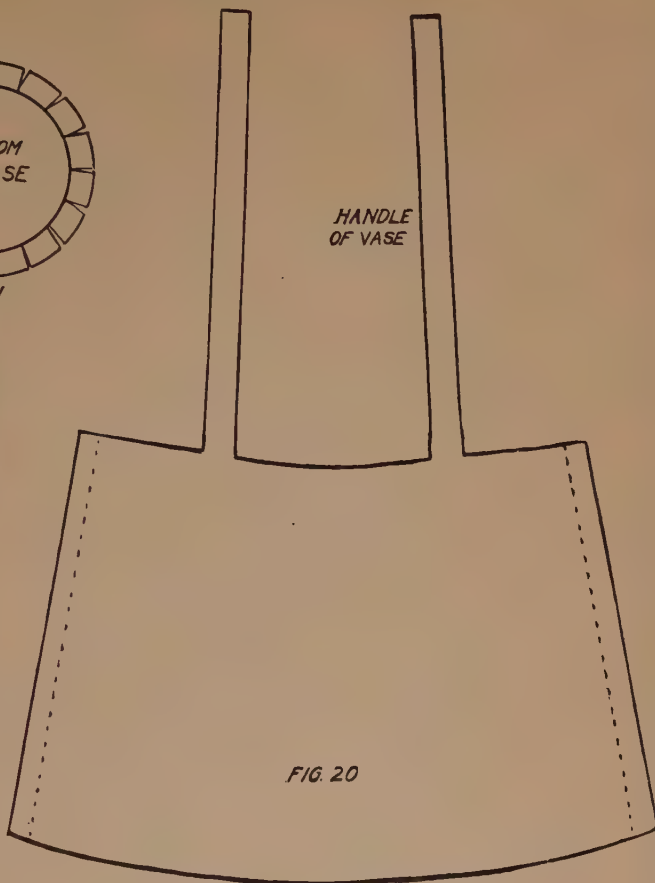


FIG. 20

square of paper, fold at center as shown in Fig. 23. Fold this at dotted line across center and it makes Fig. 24. When this is folded diagonally at dotted line, it gives Fig. 25, and by folding again, you get Fig. 26. Cut Fig. 26 across the two dotted lines, top and bottom, open out, and you have the circle with open center, Fig. 27. Smooth this pattern out flat and use it as a guide for making some of your lamp shades. The lines on the pattern are merely those caused by folding the paper.

Having cut out one shade from smooth rose colored paper, fold it

across the center, making a half circle, again fold making a quarter circle, again fold and you have an eighth circle, Fig. 28. Unfold and lap each crease over $\frac{1}{2}$ inch on bottom edge according to dotted line, Fig. 28. The next diagram, Fig. 29, shows the method. When finished, adjust the shade on the candle, Fig. 30.

Cut more disks of corn-colored paper for a different set of candle shades; fold each shade in accordion pleats like Fig. 32.

Again use the circular pattern for the pointed edge shade. Cut the

For Another Candle Shade

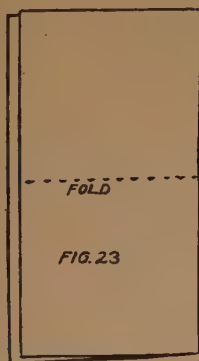


FIG. 23



FIG. 24



FIG. 25

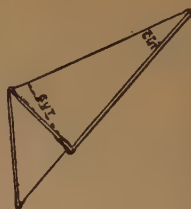


FIG. 26

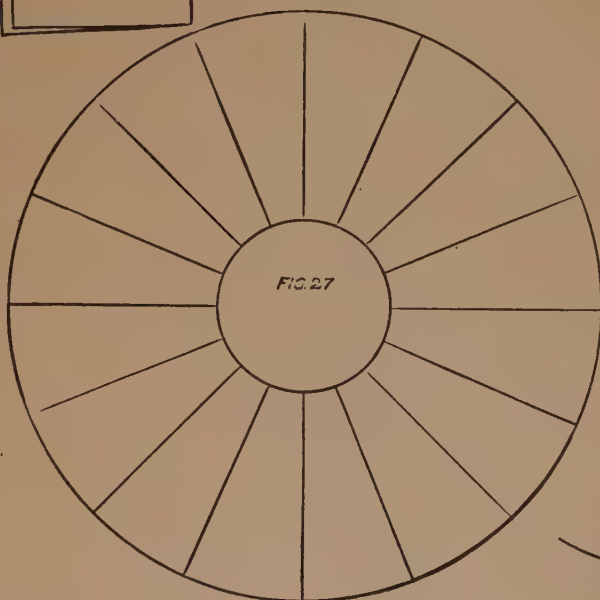


FIG. 27



FIG. 28



FIG. 29

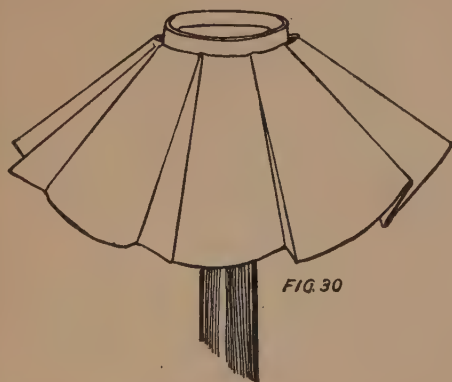


FIG. 30

A Pretty Lamp Shade

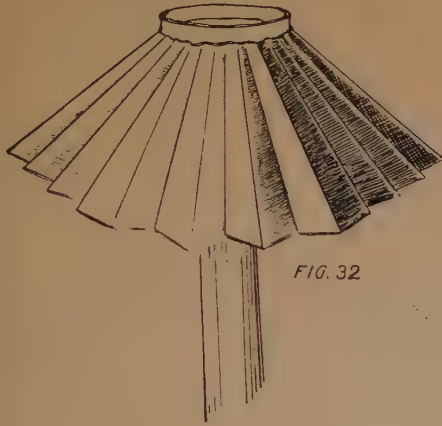


FIG. 32

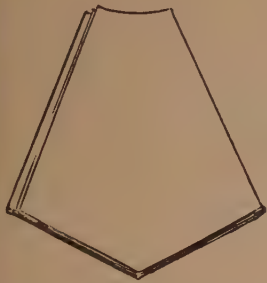


FIG. 33

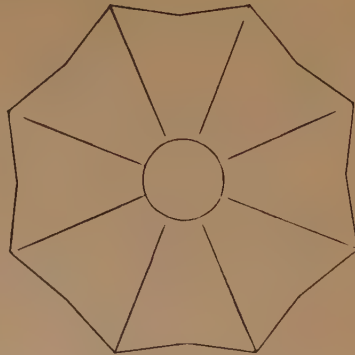


FIG. 34

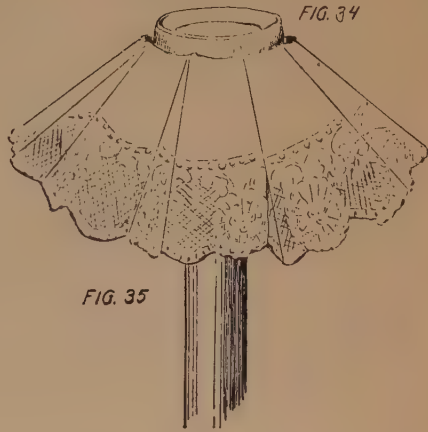


FIG. 35

disks from bright red paper, fold each shade in a-half circle, then in a quarter circle, and lastly into an eighth of a circle, Fig. 28. Cut the bottom of this into one large shallow point, Fig. 33. Open out and you have Fig. 34. Lap as in Fig. 28 and 29. This makes a very pretty shade.

One of the most attractive and simplest shades is fashioned from a lace edged paper doily, Fig. 35. Cut an opening in the center of the doily candle shade, then lap the edge in pleats like Fig. 29. The lace edge of these shades can be tinted in different colors, combining variations of pinks and greens, yellows

and browns, etc. Again, the lace can be all of one color or one tint.

The candle shade, Fig. 36, has a smooth surface without pleat or ruffle; Fig. 37 is the pattern. It is $3\frac{1}{2}$ inches deep and measures 11 inches across the spread from corner to corner, from K to K. The back lap to be pasted on the opposite side is marked L.

Brightly colored birds cut from wall paper are pasted on the white paper shade. Other designs cut from old discarded magazines or flower catalogs can be used.

The paneled candle shade, Fig. 38, is stenciled with cunning little white bunnies on a light blue back-



FIG. 37

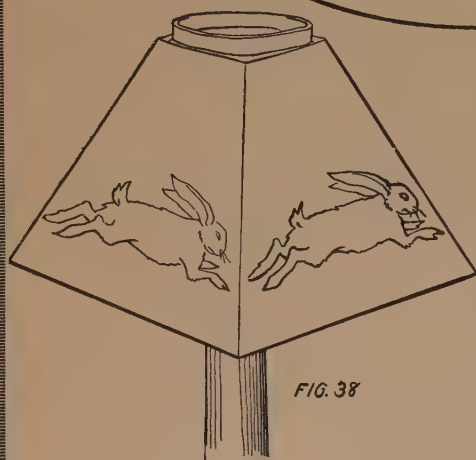


FIG. 38

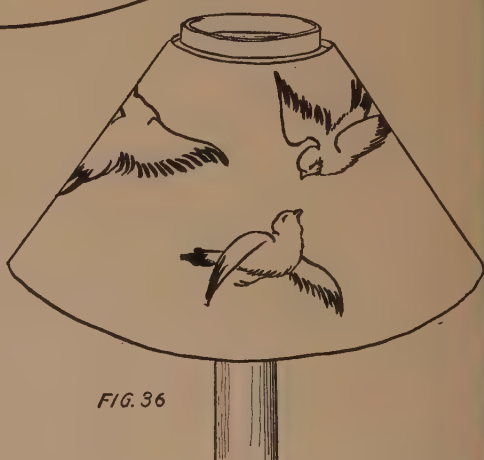


FIG. 36

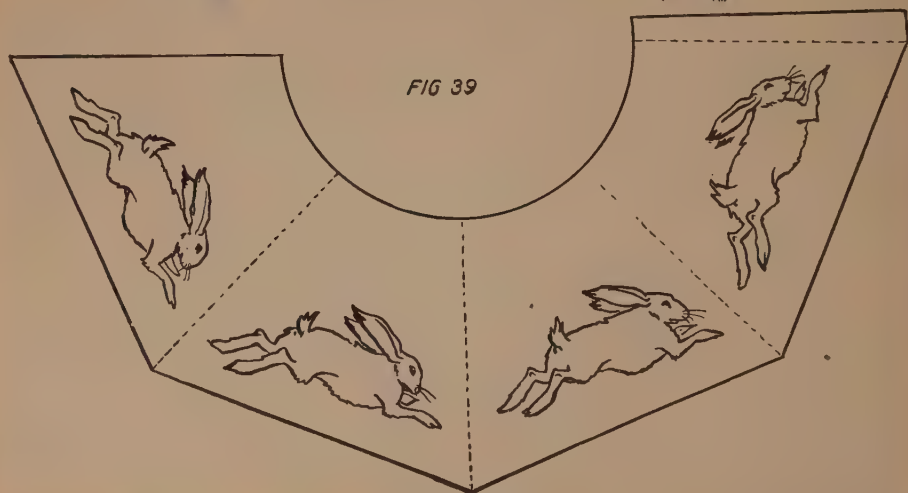


FIG. 39

ground; Fig. 39 gives the pattern with dotted lines indicating where to bend the paper.

All of the designs here given are

attractive when used as dinner or dance favors, Christmas, birthday, New Year's or Easter gifts and also as decorations.

Queen Mab

*A little fairy comes at night;
Her eyes are blue, her hair is brown,
With silver spots upon her wings,
And from the moon she flutters down.*

*She has a little silver wand,
And when a good child goes to bed,
She waves her wand from right to left,
And makes a circle round its head.*

*And then it dreams of pleasant things—
Of fountains filled with fairy fish,
And trees that bear delicious fruit,
And bow their branches at a wish;*

*Of arbors filled with dainty scents
From lovely flowers that never fade,
Bright flies that glitter in the sun,
And glow-worms shining in the shade;*

*And talking birds with gifted tongues
For singing songs and telling tales,
And pretty dwarfs to show the way
Through fairy hills and fairy dales.*

THOMAS HOOD

LESSONS AT HOME AND AT SCHOOL

STENCILING AND PRINTING

How to Make and Use Stencils and Wood Print Blocks



WHAT do you suppose the little girls in the picture are doing?

If you will look closely, you will see the heavy sheets of manila paper lying on the cloth they have spread on the table to protect it.

With their pencils they are working out a design for a stencil; and where do you suppose it will be used?

The mother of the smaller of the two little girls is going to

make some new curtains for her room. They will be of some lovely soft material, with a design stenciled just above the hem. Elena Sue has asked her little friend, Alice, to help her work out the design.

Stenciling is really very simple work, it is merely scrubbing over holes in a piece of paper with a brush covered with paint or dye. Of course, cloth is under the paper, so the brush rubs color on the cloth beneath

the open holes, and when you take away the paper, lo! the cloth is beautifully decorated.

We will choose for our first design one with simple lines easy to make, like Fig. 2. This cloverleaf motif will need but one color, a soft green, not too dark, rather light in tone. It is always best for a beginner to use only one color on the first design, but after learning how to handle the work, many colors may be used in different parts of one pattern. Regular stenciling



FIG. 1

the paint is more like a stain than paint.

Always prepare sufficient paint or dye at one time for the entire work, as it is most difficult to match the first tint or shade in a second mixing. When more than one color is used, have a separate brush and a separate cup for each.

Now let us make the stencil. Cut a piece of your smooth, heavy manila wrapping paper, $6\frac{1}{4}$ in. long and $4\frac{3}{4}$ in. wide, measure $\frac{1}{2}$ in. from each of the four side edges and

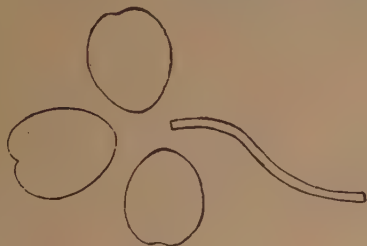


FIG. 2

colors come especially for the work, but tube oil paints or diamonds dyes give excellent results. The little stenciler in the picture is using cold

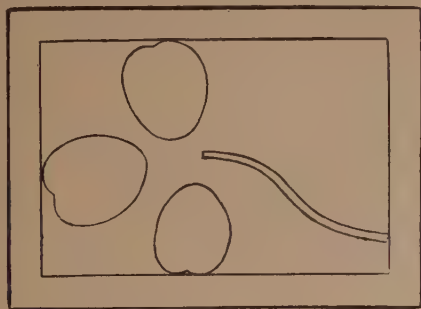


FIG. 4

water dyes, which come in tubes and are dissolved in water. The most popular kind of colors, however, are tube oil paints diluted with turpentine until completely dissolved, and

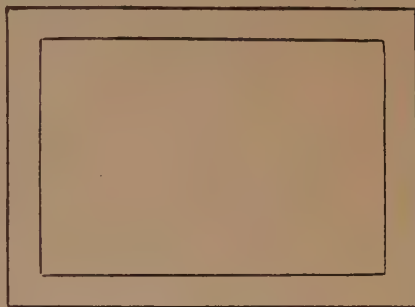


FIG. 3

draw light pencil lines across from side to side, forming a $\frac{1}{2}$ in. wide frame, Fig. 3. Notice where each of the three leaves and end of stem

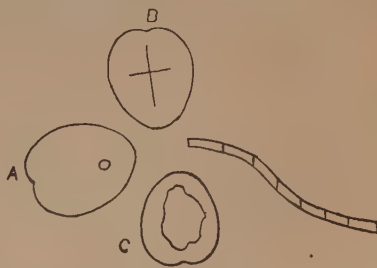


FIG. 5

touch the boundary lines on Fig. 4. Use Fig. 4 as a guide and draw in your cloverleaf pattern.

Have sharp scissors for cutting out the design, begin by running the

How to Repeat a Design



FIG. 6

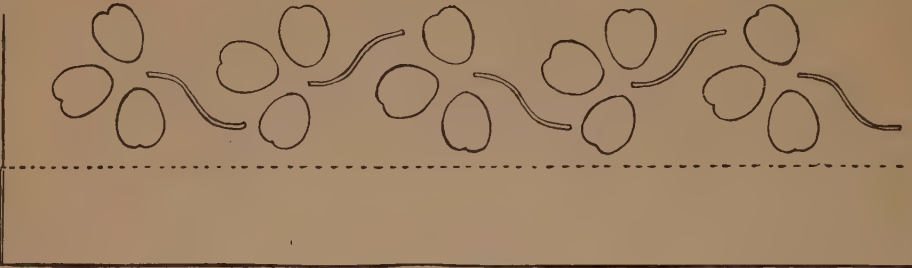


FIG. 7

point of one blade of the scissors through the lower space of one of the leaves, Fig. 5, dot on leaf A. Cut toward top of leaf; then across as in leaf B. Cut off the slashes and make a large opening, leaf C,

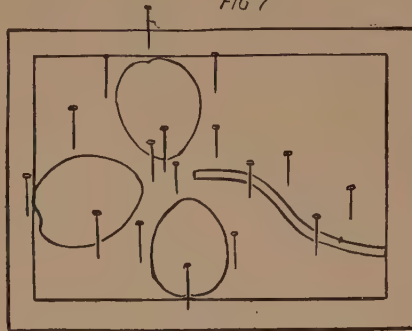


FIG. 8

which gives space to use the scissors carefully to cut evenly and smoothly along the line of the design. Be cautious while cutting out the stem not to clip beyond the lines, because such a clip will let the paint come through on the cloth at the wrong place and spoil the stencil work. Cut little by little in short sections, as shown by cross lines on stem, Fig. 5. When the entire clover leaf and stem have been cut out away from the paper leaving three even, smooth edged holes where the leaves were and one long narrow, smooth edged hole where the stem was, the paper will be a stencil.

Place this stencil down flat on a

smooth board and give it a coat of white shellac, then raise it carefully, place it on another part of the board to dry. As soon as the stencil is perfectly dry, varnish the other side and all the edges; do

not forget the edges, they are very important. Shellac stiffens the paper and makes the stencil durable and waterproof.

When the stencil is absolutely dry on edges and both sides it is ready to use, and you can begin decorating your sash curtains of fine cream colored cheesecloth. First hem top and bottom edges, then lay a large sheet of white blotting paper over the table or lapboard on which you intend to work. Over the blotting paper place the cheesecloth right side up. Have it perfectly smooth, and try measuring with the stencil to find how often the pattern can be used across the bottom of the cur-

The Arrangement of "Motifs"



FIG. 9

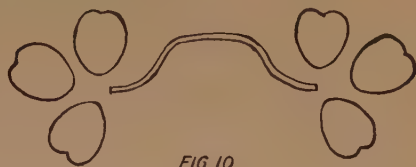


FIG. 10

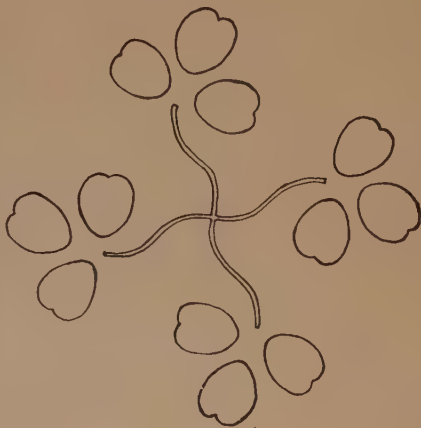


FIG. 11

tain, leaving the same sized space between each print. Having ascertained this, drive a pin where the center of each repeat should come, Fig. 6. In this example the stencil is turned and turned again in order to bring the stencil up in every alternate cloverleaf, Fig. 7. When ready to begin stenciling, make sure that the paper stencil lies absolutely flat down on the cheesecloth. You will want the decoration in a straight line over the bottom hem, so place the stencil just above the hem and secure it by driving in a pin at top and bottom and on each side of each leaf, and at intervals on both sides of the stem. Wherever the stencil seems to rise, flatten it down with a pin, Fig. 8.

Have within easy reach your prepared color, a stiff, short, stub, bristle brush and a piece of old white muslin—then commence work. Dip the brush in the paint and imme-

diately rub it on the old muslin to remove most of the moisture. If the brush is too wet, it will blur the outline of your work. Be sure to wipe it on the muslin after each dip.

Holding your brush firmly straight up and down, not slanting, begin at the left hand and scrub each opening until the cloth is of the right tint and the paint has penetrated entirely through the cheesecloth; then take out the pins, lift the stencil, and adjust it over the next pin which marks the spot where the pattern should come. Continue in this way until the border is finished.

Fig. 9 gives the finished curtains with polka dots stenciled over the entire curtain above the border at uneven distances. You can make a polka dot stencil and use it on your curtain. Cut a perfectly round hole in a piece of paper, prepare it for use as a stencil and make the dots as in Fig. 9. This clover motif can be

Designs for Various Purposes

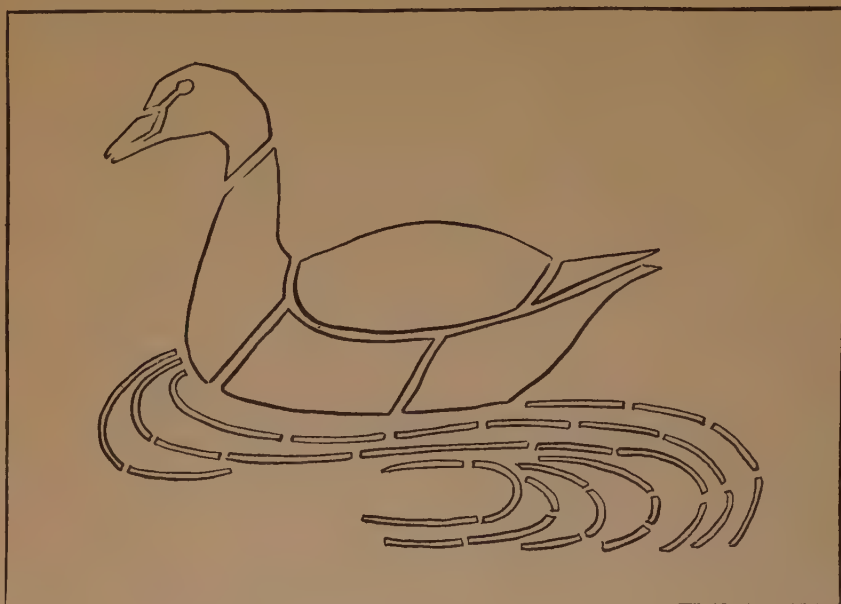


FIG. 12



FIG. 13

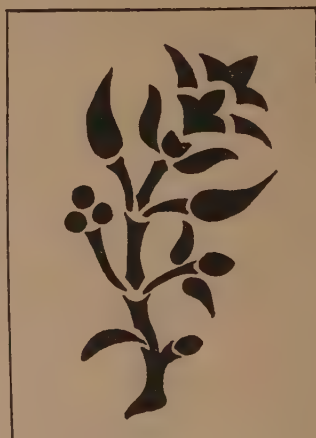


FIG. 14



FIG. 15

reversed, Fig. 10, grouped Fig. 11, used for an all over decoration alone or grouped, and it may simply be repeated without turning, making the stems all stand down.

The duck swimming on the water, Fig. 12, is fine for the playroom wall poster, toy chest, etc. It is a

from the design proper. There are ten bridges—count them—in common with the other stencil patterns. This also was worked out for you, so be sure to use it.

Stenciling may be made on almost any kind of material, except metal and rough surfaces. Wooden boxes, parasols, lamp shades, paper, linen frames, portieres, walls, splint-baskets, curtains, dresses, bags, bedspreads, lunch sets, tablecovers; and on the following weaves, monkscloth, swiss, pongee, denim, scrim, cheesecloth, linen, unbleached muslin, silk and muslin, but not on velvet or plush.

Block Printing

No bridges are necessary for this work and you use wooden blocks to print with instead of a paper stencil. Find a very simple

level, smooth side of a soft pine block, $1\frac{1}{2}$ in. thick and sufficiently large for the pattern. Rub a lead pencil lightly over the entire design, taking great care not to mark the background. This lead pencil tinting will separate the pattern from the background so you will know which is which. With a sharp knife cut down into the surrounding background, following the outline of the pattern most carefully, bevel the edge as you cut, then cut another line close to the first and in this way make a narrow wedge-shaped trench $\frac{1}{8}$ in. deep entirely around the pattern, after which you can cut away the background little



FIG. 16

stencil invented by the writer especially for you. Try it. Here is another idea. On a heavy wooden plate, stencil the pussy pattern, Fig. 13. This pussy can also be used on the lid of a round box and other things. Fig. 14 is more difficult and is for you to try after having stenciled easier patterns.

Remember, when making stencils, to always have little bridges or bands of the background reach across openings in the pattern to connect the different parts of the background together. Notice Fig. 15 is divided into many parts by the little bridges which are marked with the letter "O" that you may distinguish them

A "Beetle" Block



FIG. 17

by little, causing the design to stand out well above the background. The aim being to have the pattern $\frac{1}{8}$ in. higher than the background, much in the same way as the letters of a rubber stamp stand up higher than the stamp itself, Fig. 16.

Your color pad will be something like a rubber stamp pad, and larger than your printing block. As a foundation use a piece of wood about $\frac{1}{2}$ in. thick. Cover one side with tightly pressed down raw cotton. Glue it on the board and over the cotton glue a piece of smooth level tin. On top of the tin glue two layers of felt, cover all with a piece of muslin, bring it down over the four sides and glue it on the bottom

of the foundation. The top surface of the pad must be absolutely smooth.

Either oil paint or water colors may be used. Dilute water colors with water slightly thickened with dissolved gum arabic, but only sufficiently so to cause the water to feel a little sticky.

The oil paint can be diluted with turpentine, which should be added gradually, constantly testing the color on a piece of cloth. As soon as the diluted paint is of the right shade, spread it on your pad with a flat bristle paintbrush; dip the brush in the paint and sweep it back and forth over the pad, until the pad is well soaked, but not sloppy.

Press the block on the pad and test a print on a piece of testing cloth taken from the material you are to decorate. If the block is of good size, hold it steady on the cloth and strike it once with a hammer. Unless the blow is sharp and quick the print will not be clear.

For a Rug Border



FIG. 18

Probably you will have to experiment, making a number of prints before obtaining a satisfactory one. As soon as your block prints a clear, perfect design, begin work on your rug, curtain or whatever you have selected for decoration, but before printing, place the cloth on a slightly springy surface. Several layers of smoothly folded newspapers will do nicely.

When more than one color is needed there must be a separate block and a separate color pad for each color.

Fig. 17 is a simplified beetle print block design. A good design for the border of a solid colored ingrain, or other smooth surface rug is the original design, Fig. 18, made by cutting a folded piece of paper. You can make charming patterns in this way.

Simply fold a square piece of paper and cut out portions of it. Open the paper and your design will be made. With a little practice you will catch the idea and be able to make an endless variety of very beautiful designs.

Fig. 19 gives a border of little fluffy chicks printed with one block on which is a design of one chick. The camel, Fig. 20, is a pattern for block printing, also Fig. 21, the little seahorse and Fig. 22, the elephant.

Block printing may be applied on curtains, tablecovers, sofa pillows, bags, bed covers, sash curtains, portieres, screens, rugs, couch covers, straw matting, etc., and on most woven materials. Always experiment on a waste piece of the material you intend decorating to make sure the print will work satisfactorily.

Baby Chicken Block Border

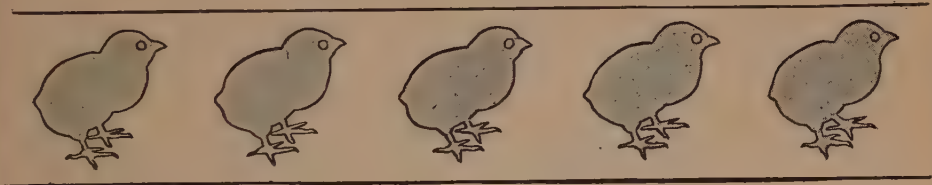


FIG. 19

A Block Printer's Menagerie



FIG 20



FIG. 21

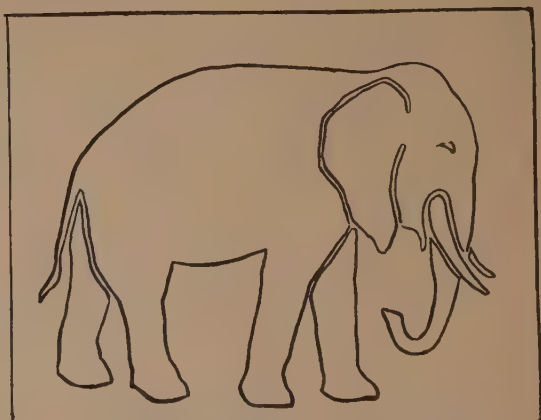


FIG. 22

LESSONS AT HOME AND AT SCHOOL

DOMESTIC SCIENCE

What Food Does for Us and What We Must Do To Food



"One cup of sugar, one-third cup of butter, cream, add the yolks of two eggs, ——"

YOU have eaten three meals a day most of your life, but can you tell what food is and what it does?

Food gives us the material for building our bodies. It is also like the fuel in an engine, for it supplies the warmth of our bodies and gives them the power to work. When the engine wears out it must be sent to the repair shop, but our bodies are daily being repaired by the food we eat.

Does it surprise you to know that the many kinds of food that you eat throughout the year—meats and fish, eggs, milk, vegetables, fruits and grains—are all made up of a very few substances? These materials are called *food stuffs*. The food stuffs found in milk are water, fat, sugar and mineral matter, and a substance called protein found in the curd. Protein is a substance that oc-

curs in the curd of milk, in eggs, in the lean of meat, in fish, in nuts, in the seeds of plants like the grains, and in peas and beans. It contains nitrogen, an element which is found in all living tissues. Although nitrogen is in the air around us and we draw it in with every breath, we breathe it all out again, and use it only in the form of protein, which will build the body and give energy.

Fat gives the body energy and is sometimes called a fuel food. Fat is a substance with which we are familiar. It is found in butter, lard, cream, in the fat of meat, in olive and other vegetable oils. The fat of meat and cottonseed oil are the cheaper fats.

Sugar and starch are two other substances that you easily recognize. These two materials, that look so different from each other, are really very much alike and Mother Nature can turn one into the other. This is what happens in our bodies, for starch is changed into sugar before

it is taken into the blood. These two food stuffs are called carbohydrates. Another carbohydrate is the fibre of our vegetable foods known as cellulose. We do not digest this, but it gives bulk and in this way helps digestion. Starch and sugar are fuel foods, too, and they are the cheapest fuel foods.

Water does not seem to you like a food stuff, perhaps. It does help to build the body, but it does not give us energy.

Mineral matter or ash you cannot see in your food but if you burn any food material long enough there is an ash left behind like the ash from wood or coal. The substances found in the ash of food, are lime, potassium, iron, sulphur and so on. These mineral substances help in body building, but do not give energy. The foods that give us energy do so through a slow burning process. Water and ash cannot give energy, because they are themselves the products of combustion.

Table for Selection of Foods

Here is a table that will help you to select foods:
Example of food materials rich in each of the food stuffs.

Proteins:

Eggs
Milk
Cheese
Lean meats
Fish

Chestnuts
Sweet fruits
Sugar

Mineral Matter:

Milk
Green vegetables
Fruits
Whole wheat and other whole cereal products
Egg yolk

Fats:

Cream
Butter
Meat fats
Vegetable oils
Nuts
Yolk of egg

Water:

Fresh fruits
Fresh vegetables
Milk
Beverages, including water as such

Carbohydrates:

Cereals and cereal products
Potatoes and other starchy vegetables

DOMESTIC SCIENCE

The Uses of Water

Water helps to build the body, to dissolve food, to carry off waste and to keep the temperature of the body even. About two-thirds of the weight of the body is water. Drink it freely every day and use it at meals, even as much as a pint, but swallow it when the mouth is empty. When you have soup, milk or beverages, drink less water at a meal. Water must be clean. It should come from a source where no filth can contaminate it. Sometimes it is necessary to boil water at least half an hour, and cool it before drinking, in order to destroy the germs of disease that are present.

Use clean vessels for drinking. Two people should never drink from the same cup. The use of paper cups, or the drinking fountain that

needs no cup, is very important. Ice must be watched as carefully as water, for freezing does *Caution About Use of Ice* not destroy germs of disease. It is better to cool water on ice than to put ice into the water.

Food Value of Milk

Milk is an important food. Milk is a perfectly balanced food for the baby and young animals who have nothing else to depend upon. It is a desirable food for grown people. Remember that it is food and not drink only. If you think milk does not agree with you it may be that you take it as a beverage in addition to quite enough of other foods.

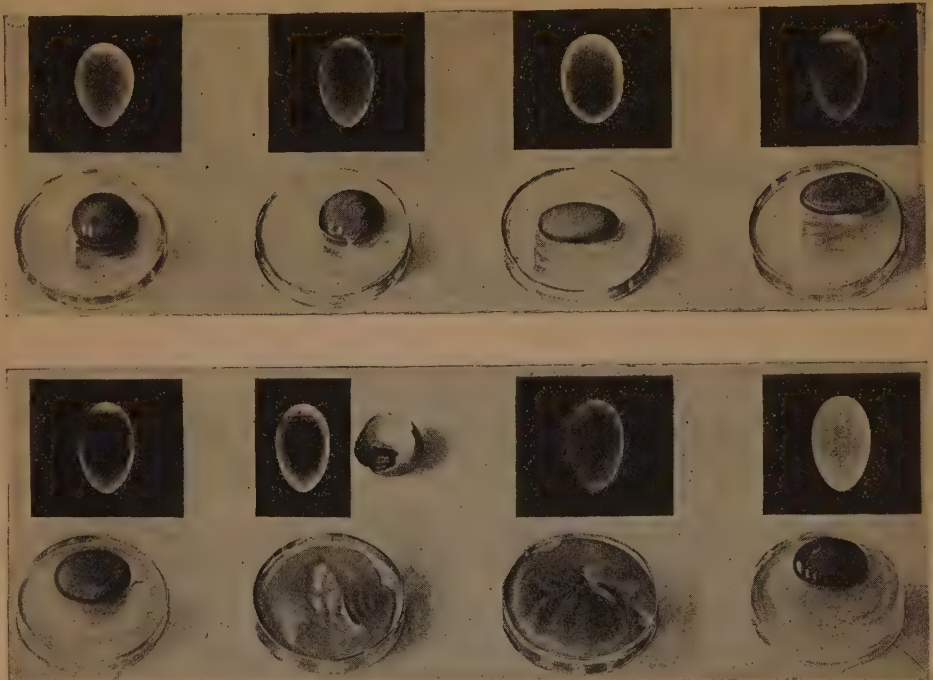
Milk must be clean, for typhoid fever and other diseases are carried in dirty milk. The cow must be in

A Class of Little Cooks



This is only one corner of the large and well equipped classroom at Central Junior High School in Kansas City. When Domestic Science was first taught in the schools, the rooms were small and equipment limited. Only a few girls could work at a time, the others watched. Today each girl has her own utensils and each one takes an active part in class work.

How to Test Eggs



Courtesy Scientific American © Munn & Co

The best way to tell whether eggs are fresh or not is to hold them before a lighted candle in a dark room. This chart will help you. It shows how the egg looked when held before the candle and also after it was broken in a dish. Reading from left to right:

1—A fresh egg. 2—Slightly stale egg showing evidence of incubation. 3—Stale egg showing a settled, flattened yolk and a thin white. 4—Egg with yolk beginning to adhere to shell. 5—Egg showing "blood ring." 6—Cracked egg invaded by mold and the shell showing mold inside. 7—White rot or addled egg. 8—Egg with a green white.

good health and kept clean. The stable, milker, all the utensils, must be absolutely clean. Milk must be cooled rapidly after milking and kept cool.

If you have no ice for cooling milk at home, scald it to kill possible germs of disease and the bacteria that sour it.

The digestibility of milk is not especially affected by cooking.

One quart of milk equals in food value one pound of steak or eight eggs. At ten cents a quart it is an economical food.

Cheese is manufactured from the curd of milk and has in it the most

nutritive parts of the milk. It is a good meat substitute.

Skim milk is valuable for cooking and contains everything in the milk but the fat.

Sour milk is also useful in cooking.

Value of Eggs

Eggs contain all the food stuffs. If you have seen a young chick come from the shell you must realize that his little body has been nourished and built by the materials in the egg with something from the shell, and that he is strong enough to pick up his next meal.

The food stuff in eggs are in such

form that they are easily digested and absorbed. They are very valuable for little children, for people who are below weight, and for invalids recovering from an illness.

Fresh eggs are not always easy to obtain. Find out if in your state there is a law to protect you from buying cold storage eggs for fresh. Perhaps you can buy them "parcel post" direct from some farm.

In cooking eggs, if you wish a delicate, jelly-like egg cook it below the boiling point of water.

A hard cooked egg takes longer to digest than a raw or soft cooked egg, but if chopped fine and properly masticated it is digestible and a very convenient dish to serve. If you prefer a soft egg that is yet somewhat firm, cook it in boiling water for four minutes.

What Shall We Do About Meat and Poultry?

Meat has become such an expensive food that we want to do without it if possible. We do not need it more than once a day, and people can keep well and strong without it. If you are in the habit of eating

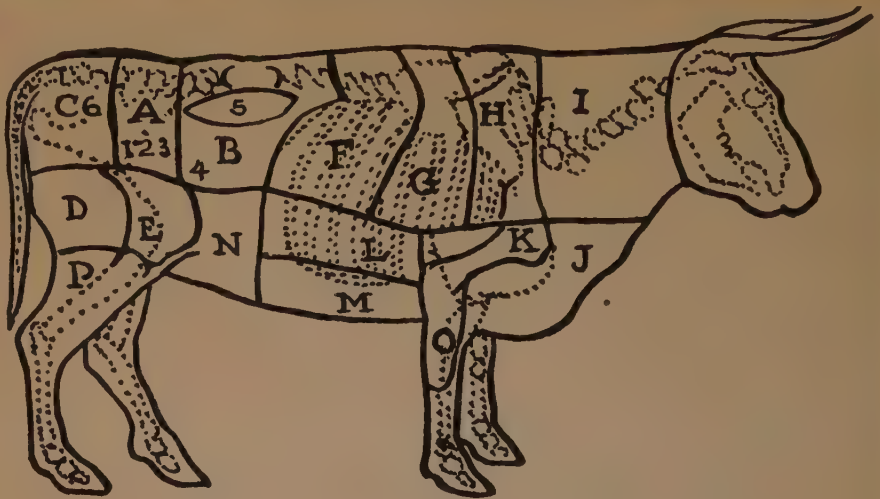
meat often, make the change from meat to other foods rather slowly. The meat substitutes are the other foods that contain protein.

Tough and tender meat vary little in nutritive value except that tough

Hereford Cattle Grazing on the Plains of Western Kansas



Thousands of head of cattle are shipped from the western ranches to the markets in Kansas City and Chicago, where the great packing plants are located. You can compare this photograph with the chart on the next page, and see just where the different "cuts" of meat come from.



The Different Cuts of Meat and What They Are Used For

- A. Sirloin
 1—Round bone sirloin, poorest sirloin
 2—Flat bone sirloin, next best sirloin
 3—Hip bone sirloin, best sirloin steak
 B. Porterhouse
 4—Club steak
 5—Tenderloin
 C. Rump
 6—Corning, best corning piece
 D. Round
 Used for steaks and pot roasts
 E. Top sirloin
 Used for steaks and pot roasts

- F. First prime ribs
 Good Roasts
 G. Second cut ribs
 Good roasts
 H. Chuck ribs—poorer roasts and steaks
 I. Neck—for beef tea, stews and boiling
 J. Brisket—corning
 K. Cross rib—pot roast
 L. Plate—corning
 M. Navel—corning
 N. Flank—stew or boiling
 O. Shoulder—soup
 P. Shin—soup

meat contains somewhat more material than the tender.

Tough meat comes from the parts of the animal's body that are most exercised, and tender meat comes from the less. Tough meat is cheaper because it is less in demand.

If meat is taken in excess, too much acid is formed in the body, and people who eat meat must be careful to take fruit and green vegetables and plenty of water. Meat spoils easily and may contain bacteria that gives us disease. State

*Dangers
 From
 Meat*

and city inspection of meat and clean markets should protect the consumer from this cause of meat poisoning. Parasites like the tapeworm come from meat and these are destroyed by thorough cooking. The housekeeper must be careful to cool

off cooked meat and broths rapidly, for in tepid mediums bacteria may develop. This is very important.

In cooking tender meat the outside surfaces are seared by intense heat, and the inner part cooked at a lower temperature. These processes are broiling, boiling, and roasting. In cooking tough meat we must use a lower temperature for a long time to soften the tough fibre. The processes are stewing, braising, and pot roasting.

In soup making and in beef tea the juices of the meat should be extracted by cold water which is slowly heated afterward.

Over-cooked meat has a shrunken and hard fibre. Do not fry tender meat in fat, but use only enough fat to keep the meat from sticking to the pan. The tenderest meat cooked

How Meat Should Look



By studying the diagram of the steer divided into the different cuts, and comparing it with the pictures of the cuts on this and the next page, you can learn to know what you are buying and whether it is what you want or not.

At the top are two pieces of round steak, (1) and (D) on the diagram. Below are the two best sirloins, (2) and (3) on the diagram. Compare the shape of the round and sirloin cuts with that of the Porterhouse on the opposite page. If you know how these cuts look, a dishonest butcher will never sell you a sirloin for a Porterhouse and charge you accordingly. At the bottom are the best rib roasts in the animal.

Chops and Steaks



In the top row are four different kinds of lamb chops, taken from different parts of the animal, and three of the lower grades of steaks. The next two are roasts. The chuck rib roast is not so good as the blade rib roast on the right, which is taken from the vicinity of the seventh and eighth ribs. Notice how the meat is streaked with fat in the better roast. The last row on the page shows the two best cuts of steak.

hard in fat is but little more digestible than sole leather.

In buying meats select that which

is firm and with a good red or pink color, and poultry that is firm, with fat under the skin. Poultry that has

a dull colored, broken skin may have been in cold storage too long.

Cereal Products

Breakfast foods made from grains are a valuable part of the diet and are manufactured from oats, wheat, rice, corn, and sometimes barley and rye.

In cooking cereals, we need to soften the fibre of the grain, and thus make the other food stuffs easier for the body to assimilate. The starch grains are opened by the heat.

How to Cook Cereals

Flaked cereals need at least two parts of water to one of cereal. Granular cereals need three to four times as much water as cereal. Cracked wheat, coarse corn meal and samp need from four to six parts of water. One cup of dry cereal is enough for three or four people. A tablespoonful of salt to a quart of water is a good amount. The water must be boiling and the cereal dropped in so slowly that the water does not stop boiling. When the cereal is thickened, cook it in a double boiler an hour or more.

Cold cereals should not be wasted. They can be molded in small cups with fruit cut in slices and made into small cakes mixed with beaten egg. They may also be used in muffins, yeast bread, and for thickening soup.

How to Make Good Bread

Yeast bread, made of good white flour, is so extensively used that it may still be called the staff of life.

The flour should be creamy in color and granular to the touch. A good mixture for bread is a combination of flour made from spring wheat, which is planted in the spring

and matures in the summer, and winter wheat growing farther south and living through the winter.

The loaf should not be too large. This gives a good crust and the loaf is easily baked to the center. The crumb of the bread should be creamy and not snow white, and when it is pressed between the fingers it should be tender and elastic. The crust should be even in color,—a golden brown—and it should be crisp and soft, but not hard and tough. Here is one score card used in judging bread:

Bread Score Card

I. General Appearance.....	15%
1. Shape	2.5%
2. Size	2.5%
3. Crust	10.0%
(a) Color.	
(b) Smoothness.	
II. Internal Appearance	55%
1. Depth of crust....	10%
2. Texture	
(lightness)	15%
3. Crumb	30%
(a) Moisture	
(b) Elasticity	
(c) Color	5%
III. Flavor	30%
	100%

Bread is a cheap food compared with other foods.

In making bread at home the necessary materials are flour, yeast and liquid. You may add salt to give flavor, a little sugar, and sometimes fat to make the crust more tender. Nuts and raisins make a pleasant variety, added to white or whole wheat flour bread.

Yeast is a tiny, one-celled plant. In preserving fruit and vegetables

we destroy it, but in making bread we cultivate it. The bread mixture gives it food and moisture, and if we warm the materials and keep the dough at a temperature from seventy to eighty degrees, the yeast will bud and increase. As the yeast cells multiply they form a gas, which expands and makes the whole mixture light. A small amount of alcohol is

*How Yeast
Makes Bread
Rise*

fourth to half a yeast cake to a loaf is allowable. All the materials should be warmed, thoroughly mixed, set in a covered bowl until the mass doubles its bulk. The dough must be kneaded by hand, or better by machine, until it is smooth and elastic. It then can be divided, put into greased pans and left to rise again to double its bulk, when it is ready for baking. Kneading makes a fine grain, and

Serving the Meal Correctly



Entertaining will be a pleasure to these young ladies when they have their own homes. How to set a table and to serve a meal correctly is an important feature of Domestic Science classes.

also formed, but the gas and alcohol pass off in baking.

The proportions used in making bread are one portion of water to three of flour, which makes a loaf of good size. The liquid may be half milk and half water, in which case the milk should be scalded first and cooled to the proper temperature by adding the water cold. The larger the amount of yeast used the quicker the process of rising—from one-

some people knead the bread twice before it is put into the pans. The bread should be baked at a steady temperature of about 380° F., from three-fourths of an hour to an hour. This is what is called a moderate oven.

The care of bread after baking is important. It should be cooled before putting away and not eaten for twelve hours. Keep it in a stone jar or tin box, which should be scalded

with boiling water before new bread is put in. The bread may be covered with clean paper to keep it from drying.

Stale bread may be used for toast, bread crumbs, scalloped dishes, and puddings. All pieces should be saved for these purposes.

Mixtures of flour with milk or water, salt, sometimes eggs and baking powder, are called quick breads—muffins, pop-overs, and so on.

Use of Quick Breads They are convenient and make an agreeable change, but they do not take the place of yeast breads.

Baking powder is made of some acid substance like cream of tartar mixed with bicarbonate of soda, and when these are combined with the liquid and heated, a gas is given off. The proportion of cream of tartar and soda is two to one. Sour milk and bicarbonate of soda also give off the gas. A level teaspoonful of soda to a cup of sour milk is about the right proportion. Acid molasses and soda behave in the same way, but the modern canned molasses contains no acid and baking powder must be used with it. In buying baking powder avoid the kinds that offer prizes. They may contain an inferior kind of acid and a large amount of starch or flour, only a little of which is necessary in any baking powder. A

standard kind from a well known firm is the most economical in the end.

Quick breads are more wholesome if reheated and not eaten just after they are taken from the oven. This is also convenient for the housekeeper who may bake them the day before and warm them over for breakfast. This makes the crust crisper and the crumb drier.

Breads Made of Cornmeal

We should use more cornmeal than we do in our quick bread, as it is a wholesome and economical material. The cornmeal ground in a modern mill needs rather more moisture and more fat than the old-time meal ground between stones. If you cook the cornmeal thoroughly before making the muffins you will find the flavor better, and the muffins less dry.

Canning Tomatoes



These little girls, pupils in the grade schools of Kansas City, Missouri, are busily canning tomatoes raised by their fellow students in the school gardens.

Fruit in the Diet

Fruit should be eaten daily, for it contains some of the most valuable mineral substances. In buying fruit select the least expensive, for the cheaper kinds are just as useful as those with the fancy prices. Apples are especially useful in the diet.

Cooked fruit is more digestible for many people than the uncooked and this is especially true of little children. Cooking softens the fibre and

destroys disease-breeding bacteria.

Canning and preserving processes are necessary, because they give us fruit and vegetables cheaply when they are out of season.

We preserve food by destroying bacteria, yeast and molds through the application of heat and by sealing the cooked food material thus keeping out these lower forms of life.

Preservatives are materials in the food which prevent the growth of these little organisms. The old-fashioned preservatives are sugar, salt, smoke, spices, vinegar and even alcohol. A little sugar causes fermentation because it gives food to the tiny yeast cells but a larger amount prevents their growth. Nowadays chemical materials are often used, and when these prove hurtful we should be protected by pure food laws.

Drying also preserves food materials because the tiny living cells need moisture just as we do, and cannot live without it.

Food Stuffs Contained in Vegetables

Vegetables are a valuable food. This list shows you what food stuffs vegetables contain:

Seeds contain all the food stuffs high in protein.

Roots and tubers contain all the food stuffs low in protein and fat, high in starch or some form of sugar.

Rinds contain all the foodstuffs in small amounts. The mineral content are the chief value.

Of leaves and stems the mineral content is the chief value.

In cooking vegetables we need to save the valuable mineral matter. It is better to use the iron found in spinach than to take it in doses from a bottle of medicine. When we cook our vegetables in boiling salted water and throw the water away we sometimes lose the most valuable part of our vegetables.

Bake, steam and stew vegetables whenever you can because in this way no nutritive material is lost. Stewing is cooking in a small quantity of water, to be served with the vegetables, or thickened for sauce.

Boil vegetables when they are old and you wish to be rid of a rank flavor. When you boil potatoes boil them with the "jackets" on.

Time Table for Stewing and Boiling

(For stewing and boiling unless stated otherwise.)

Fifteen minutes.—Tender cabbage and sweet corn. These are usually cooked too long.

Thirty minutes.—Asparagus; peas; potatoes of medium size; summer squash; tomatoes.

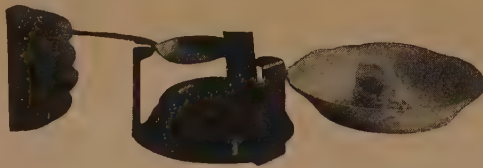
Forty-five minutes.—Young beets and carrots; onions; young parsnips; medium potatoes, baked; sweet potatoes, boiled.

One hour.—String and shelled beans; cauliflower; oyster plant; winter squash, steamed or baked; young turnips.

Two hours.—Old carrots, beets and turnips.

Six or eight hours (or more.)—

Is It Real Butter?



Genuine butter boils quickly. Adulterated or imitation butter melts, but is slow to boil.

Dried beans, lentils, and peas, baked in the oven, with water added.

Something About Meat Substitutes

We have already studied the use of milk and eggs instead of meat.

Fish is a wholesome and economical substitute for meat in most cases. It spoils rather easily, and people who do not live by the sea and who cannot have a supply of fish from lakes and rivers should be careful in buying fish.

In buying fish see that it has been kept on ice, notice that the flesh is firm and the eyes bright. Notice the odor also. If in cooking there is a strong, tainted smell coming from the fish, do not use it. Canned, salted, and smoked fish is easily obtained and is very useful as a change from meat. If the top of the can bulges at all, do not buy it. The old-fashioned boiled salt cod-fish dinner with potatoes and beets is a simple and palatable meal. Notice in cooking fish that the connective tissue dissolves very easily, and that the fish is apt to fall apart. When fish is boiled it should be wrapped in cloth.

Left over fish will make a palatable breakfast, luncheon or supper dish with bread crumbs, rice or mashed potatoes.

Nuts are a simple and wholesome meat substitute. If cooked they are

digestible for some people who cannot eat them raw. In any case they should be thoroughly chewed. They may be used in salads, in sandwiches, put into bread and muffins chopped and mixed with stewed or

raw fruit, or eaten with salt and with raisins for a dessert. It may be that some people consider them indigestible because they eat them between meals or when they have partaken of quite enough meat food of other varieties. Remember that they are very rich in protein and treat them as a part of the meal in place of meat and you will probably have no indigestion.

The Use of Salads

Salads can be used on many oc-

casions—for luncheon, dinner and supper. The salad made of crisp green vegetables, of cooked vegetables, of fruit, of cold meat, fish, and of nuts served with a simple dressing make a pleasant variety in our diet. When made from cooked vegetables and left-over meat and fish, they are economical. They are wholesome when used as an essential part of the meal, and not as an extra when there is enough of other kinds of food.

Green vegetables should be thoroughly washed, thoroughly dried and cooled until they are crisp. All other materials should be cut in small pieces and chilled before they

How to Judge Food



The can of plums is unsafe. It is probably partly decayed. Gas has formed as is shown by the partly blown out top of the can. Don't buy cans of food that look like this. They are dangerous.

are mixed and served on the green vegetables. The salad dressing may be nothing more than an acid with salt and pepper and an oil like olive oil or corn oil. More elaborate dressings are made from an acid and oil mixed with egg either cooked or un-

nin present will be lessened.

Coffee contains caffeine which has somewhat the same effect as the theine. It also contains the tannic acid, and it is considered better to use a drip coffee pot or a percolator than to boil the coffee.

"Doing Up" the Dishes



© Wide World

Part of the cooking lesson is to wash every dish and utensil and put it away in its place. This is a class in one of the Junior High schools in Chicago.

cooked. Butter may be used instead of olive oil in the cooked dressing.

Beverages and Their Use

Cocoa and chocolate are food as well as drink as they contain more or less fat—the chocolate more than the cocoa.

Tea is an agreeable beverage that we probably shall not give up. It contains theine, the substance which keeps some people awake, and tannin which injures digestion. Do not boil tea, and never let it stand on the leaves more than three to five minutes. In this way the amount of tan-

Young people should avoid both tea and coffee, and grown people should not take them in excess. One cup of coffee for breakfast seems to have little effect on some people. We should all be better without either.

Cereal beverages made from roasted grain give a pleasant hot drink in the morning, and are recommended often as a substitute for the tea and coffee.

What Shall We Have for Dessert?

A dessert must also be looked upon as giving a part of the nourishment afforded by a meal. We give

this name "dessert" to whatever we serve after the meat or meat substitute and vegetable courses.

Light desserts of fruit alone or made into pudding with some starch or with gelatine, belong at the end of a meal where there has been a large supply of meat and vegetables.

Desserts containing more food stuffs belong at the end of a meal where there is little meat or meat food. There are desserts made from eggs and milk, milk puddings, suet puddings, and pies where the fat in the crust is an important food stuff.

Pies need not be abolished provided the crusts are light and thoroughly baked. They should not be

As to the Eating of Pies eaten too often, certainly not three times a day, for then they take the place of more desirable food. Used once in awhile they are a useful food. People who eat soggy, under-baked pie crust probably will have digestive troubles. It is a good plan to use a top crust only. If you wish a bottom crust too, bake that first, having coated it over with a little beaten egg. A still better way is to bake a pie crust in small squares or diamonds entirely by itself, serving it with stewed fruit. Or, again, bake the crust thoroughly in small patty pans, and then put in the material which is to give flavor.

Something About Buying Food

Visit the shops from which you buy. Select clean places. All bakery food should be under glass. Do not buy any food that has been exposed to the dust of the street. Insist that the grocer and the market man shall have screened windows and doors. Notice if the market has floors, walls, and so on, that can be readily washed. Has the market man or the

fish man a good cold storage place? The odor in a meat or fish market will soon tell you whether the place is clean or not.

Study very carefully those places that advertise special sales, bargains and cut rates. It may be that these are all right, but sometimes inferior goods are put into the bargain sale. Bargain eggs are sometimes a mixture of large and small, semi-fresh and decidedly stale eggs. In large cities it is true that on Saturday evening good material can be bought at a low rate.

Have a set of weights and measures at home to protect yourself. The Federal Government passed a law in 1914 requiring that all goods purchased in packages shall have their weight stated upon them. There are, however, many tricks of the trade, and the only way that you can be sure of getting your money's worth is by having a standard set and weighing what you purchase. If your dealer knows that you are doing this he probably will give you honest weights and measures. Notice how your meat is trimmed.

When food is kept at home it must be kept clean and dry, and perishable food must be kept cool. Have a good refrigerator if possible. If you cannot have this, perishable foods, like milk, meats and fish must be purchased in small quantities. The semi-perishable foods—butter, eggs, and cooked foods—will keep for a time outside of the ice box, but must be in the coolest place possible. A window-box will help, especially if netting is inserted to allow a current of air. Have glass jars and tin boxes for keeping other kinds of food. The amount that you can keep on hand

depends upon your storage space. It is cheaper to buy in quantity if you have a large pantry.

Clean hands and clean clothing are absolutely essential for those who do the handling of the food and the cooking.

A clean kitchen is also an absolute essential. Everything in the kitchen should be washable and kept clean as soap and water and scrubbing can make them. Dirty dish cloths and towels are nothing less than an abomination. Where there is plenty of boiling water, dishes should be dried on a rack and the dish towel abolished as much as possible. This is the safest practice according to the latest scientific investigations.

How Shall We Plan Our Meals

The daily planning of meals is indeed the hardest question of all. We may buy food economically, we may cook it palatably, but if we do not make good food combinations in proper quantities for the family, we

have not yet learned all of our food lessons.

A meal may be defined as an assemblage of several kinds of food served together at one time. Meals should be regular. It is not only important to have meals at just the same time every day on the house-

*About the
Sunday
Meals*

keeper's account, but for our own health. Meals of the same amount should be eaten at the same time each day. The change on Sunday of the time and kind of meals is fruitful of much discomfort on Monday. Try to make some plan for having all Sunday meals at the same hours as week days. If the family must have an extra nap on Sunday try to arrange so that it comes at some other time of day rather than at the morning hour.

Breakfast, luncheon and dinner, or breakfast, dinner and supper are the three standard American meals. Here are three sets of plans for these meals:

Typical Breakfast Plans

I	II	III	IV	V
Fruit	Fruit	Fruit	Fruit	Fruit
Toast	Cereal	Meat	Cereal	Cereal
Beverage	Toast	Toast	Meat	Meat
	Beverage	Beverage	Toast	One other hot dish
			Beverage	Toast
				Beverage

Typical Luncheon Plans

I	II	III	IV
Hot dish	Hot dish	Soup	Soup
Bread and butter	Bread and butter	Another hot dish	Two other hot dishes
Beverage	Simple dessert	Bread and butter	Salad
	Beverage	Dessert	Dessert
		Beverage	Beverage

DOMESTIC SCIENCE

Typical Dinner Plans

I	II	III
Two hot dishes (meat and vegetable)	Soup	Soup
Bread and butter	Two or three other hot dishes (as meat and one or two vegetables)	Two or three hot dishes
Beverage	Bread and butter	A relish (as jelly or pickle)
	Dessert	Bread and butter
	Beverage	Salad
		Dessert
		Beverage

You can see that all the food stuffs are present in all these meals in whatever form. Where there are fewer dishes there must be more of each single dish. One can observe a few simple rules that will help to give variety. It is natural for us to seek variety and to object to meals that are quite alike day after day. Take one of the dinner plans, for instance; have one vegetable a starchy vegetable like potato, or have rice or hominy in place of potato once in awhile. Have one of the two vegetables green like spinach or asparagus in season. Do not have two or three of the root vegetables together like beets, turnips and carrots. If you have an acid soup at the beginning of the meal do not end it with an acid fruit. If you have a milk soup at the beginning of the meal do not have a milk dessert at the end. If there is meat left over for another meal, and you have a place to keep it without spoiling, do not serve it at the next meal.

Some of our natural desires are proved to be good by science, as for instance our liking bread with butter; of potatoes and gravy with meat; of something acid with fish; of cranberry sauce with turkey; of apple sauce with pork. On the other hand some of our habits and tastes are not a safe guide. Griddle cakes with maple syrup, followed by sausage or

pork chops, are a poor combination except for some person with strong digestion who has to work with his muscles in the open air all day. This leads us to the next question.

Different Diet for Different People

Different people need different kinds and amounts of food. A small person needs less food than a large one. Men seem to require more food than women. A man working hard all day in the open air needs more food than a man sitting at his desk, and can digest foods that a person living in doors can not. The baby and the child need less food than the grown-up, but it must be of a kind that builds the body, like milk, eggs and grains.

How can we measure our food? Scientists have learned to measure the amount of energy needed daily by people of all ages and sizes, and they know how much energy each kind of food will yield. The energy is expressed in terms of heat and the heat is measured by a unit, just as we measure heat by the degrees of a thermometer, or the length by the inches on a foot rule. The unit taken is enough heat to raise one pound of water 4° F.; or one kilogram of water 1° C. This heat unit is called a calorie, which comes from a Latin word *calor*, heat, and

*Measuring
the
Energy*

it means nothing but a heat unit. five, showing how many calories
Here is a table for a family of they need a day.

Food Requirements

Members of Family	Age	Weight	Total Calories	Protein Calories
Man	40	154	2680	268-402
Woman	38	120	2160	216-324
Girl	16	110	2200	220-330
Boy	12	75	2250	225-338
Boy	6	40	1600	160-240
Total requirements .			10,890	1089-1634

Food

	Calories	
Milk	20	(6 for each child, the rest for the adults.) (One quart of milk yields 6¾ portions.)
Cereal	5	
Eggs (for children ...	2	Counting 2-3 portion per egg.
Fruit	5	
Green vegetables	2	
Meat or meat substitute.	5	
Bread	15	
Butter	15	

The energy given by the protein is put in a separate column to warn us against eating too much protein, especially in the form of meat. Let us now take a list of the foods that we should be likely to have in one day, allowing for the children the materials that make for growth.

100-Calorie Portions

The 100-calorie portion is convenient to use in making up menus. Roughly speaking an ordinary slice of bread is 100 calories. A square piece of butter that we put on a butter plate is 100 calories. An ounce of cream cheese is about 100 calories. About 2-3 of an ordinary glass of milk, weighing a little over five ounces is 100 calories. A very large egg gives 100 calories.

Here are menus made up with the kind of food that should be included.

Menu No. I:

Breakfast

Oranges
Flaked Wheat
Twice baked rolls and butter
Milk for children

Luncheon

Creamed salmon on toast
Peas
Graham bread and butter
Stewed pears
Milk to drink

Dinner

Clear tomato soup
Roast beef
Mashed potatoes, string beans
Cabbage salad
Lemon jelly, whipped cream
Milk for children to drink

DOMESTIC SCIENCE

Menu No. II:

Cocoa

Breakfast

Grapes
Oatmeal
Toast with butter
Cereal café au lait for children

Luncheon

Eggs au gratin
Stewed tomatoes
Bread and butter
Raspberry tapioca

Dinner

Julienne soup
Roast beef
Creamed macaroni, spinach
Celery and nut salad
Pineapple ice, lady fingers
Milk for children to drink

Following this is a table which will show you how to calculate 100 calorie portions:

Food Material	100-Calorie Portions	Total Calories	Protein Calories
Oranges	2.5	250	28
Flaked wheat	5.0	500	74
Rolls	5.0	500	61
Milk for children.....	6.0	600	114
Thin cream for cereal.....	5.0	500	26
Butter for rolls.....	5.0	500	5
Sugar for coffee.....	1.0	100	..
Creamed salmon			
Salmon	3.0	300	160
Milk	2.0	200	38
Flour	0.3	33	4
Butter	2.0	200	2
Toast	3.0	300	43
Peas	2.5	250	70
Butter for peas.....	1.0	100	1
Graham bread	5.0	500	68
Butter for bread.....	5.0	500	5
Pears	2.5	250	8
Sugar for pears	2.0	200	..
Milk to drink.....	6.0	600	114
Tomato soup			
Tomatoes	0.5	50	10
Butter	2.0	200	2
Flour	0.3	33	4
Roast beef	5.0	500	138
Mashed potatoes	5.0	500	52
Milk	1.0	100	19
Butter	1.0	100	1
String beans	0.5	50	11
Butter for beans.....	1.0	100	1
Bread	5.0	500	72
Butter	5.0	500	5

PICTURED KNOWLEDGE

Food Material	100 Calorie Portions	Total Calories	Protein Calories
Cabbage salad			
Cabbage	0.5	50	10
Lettuce	0.1	10	..
Heavy cream for dressing.....	2.0	200	4
Lemon jelly			
Gelatine	0.5	50	45
Lemon juice	0.1	10	..
Sugar	4.0	400	..
Whipped cream			
Heavy cream	3.0	300	7
Milk to drink.....	6.0	600	114
		10,583	1,286

Of course it is not to be expected that any housekeeper can do this every day, but if she will take a little trouble to check up her meals she will soon learn whether or not she is giving her family enough or too much of any one kind of food.

The Cost of Meals

It does not follow that because we spend a great deal on our meals that we are getting the best value for our money. An investigation which was made some years ago showed that some people who were spending as much as eighty cents per capita were not giving enough mineral content to their families. They were not so well off as women spending only eighteen to twenty-five cents

per capita per day. The smaller the income the higher the percentage must be paid for food for we cannot go below a certain amount per day and be nourished. Food prices have risen so tremendously in recent years that nourishment cannot be provided at anything like the cost when prices were more moderate. The only way to keep the energy and body building values is to substitute cheaper materials right through; less butter and cream, more beef fat and cottonseed oil. The cheaper cuts of meat, vegetables in season, or dried and canned, out of season. Remember that bread always ranks among the cheaper foods on account of its great food value. Here is a table that shows this:

Amounts of Protein and Energy Obtained for Ten Cents Expended for Bread and Other Foods at Certain Assumed Prices Per Pound

(Note.—The prices given do not profess to be current. They are arbitrarily assumed merely for the purpose of comparison.)

Food Materials		Price	10c will buy Ounces	10c worth will contain Protein Ounces	Fuel value of Calories
Wheat bread..	\$0.05	per lb.	32.0	2.9	2400
Cheese	.22	per lb.	7.3	1.9	886
Beef, average..	.20	per lb.	8.0	1.2	467
Porterhouse stk.	.25	per lb.	6.4	1.3	444
Dried beef	.25	per lb.	6.4	.1	315

DOMESTIC SCIENCE

Food Materials	Price	10c will	10c worth will contain	
		buy Ounces	Protein Ounces	Fuel value of Calories
Eggs	.24 per lb.	10.0	1.3	198
Milk	.09 per qt.	38.3	1.2	736
Potatoes	.60 per bu.	160.0	...	2950
Apples	.0½ per lb.	320.0	...	1270

It is only through the most careful planning and buying and the using of meat substitutes that money can be saved and the nutrition value kept up to standard.

As Regular as a Clock

*When things go just a certain way,
As steady as can be,
They're "regular as a clock," we say;
Now, that's what puzzles me.*

*A clock's not regular at all;
I know this for a fact—
So don't depend upon it when
You want to be exact.*

*Now, our clock, why it's just as sure,
When I am having fun,
And bedtime hour is drawing near,
To break into a run.*

*And through the night it gallops on
Until, to my surprise,
It's morning, and I know that I
Have hardly closed my eyes.*

*Then when I go to see the boys—
I often wonder why—
The hours go by so very fast,
They seem to fairly fly.*

*But then, sometimes, when I'm in school
It's just the other way;
The old clock goes so slow, so slow,
It seems the longest day.*

*And when it's near vacation time,
That is the worst of all;
It's slower than the slowest snail;
It scarcely seems to crawl!*

*A clock's not "regular" at all;
I know this for a fact—
So don't depend upon it when
You want to be exact.*

NORMAL INSTRUCTOR



© Pacific & Atlantic

Busy Boys in a Manual Training Workshop

LESSONS AT HOME AND AT SCHOOL VOCATIONAL TRAINING

The Boy and His Workshop



Carpentry Class in a Public School

THERE is nothing that a boy can do that is more real fun than "making things." To be sure some of the things that a boy wants for his room or for his sports may be purchased, but the money they cost will soon fit out a boy's workshop where he can learn to make most things

he would otherwise buy. He will also be able to make many things not easily purchased, for himself, for his home, and for his friends. There is a certain delight in making and doing for one's self that is gained in no other way. Things you make

*The Joy of
"Making
Things"*

you prize much more highly than those you buy, for into them you have built a part of your own self—your thought, your labor, and your skill. They are your attempt to do as your primitive ancestors did, to make your material surroundings better suited to your needs.

The Educational Value of Making Things

Besides the satisfaction, the experience of making and doing is of the greatest educational value to a boy, for by it he becomes familiar with many of the tools and materials

begin. Much may be done with only a few of the more common tools. Of course it is best to have

*Elaborate
Outfit Not
Necessary*

some room or corner of a shed or basement that may be considered the

workshop, but even this may be left out at first. The things essential for the beginner are a clean, roomy, dry place in which to keep tools when they are not in use, a few good tools, a little inexpensive lumber, some nails and an ample and permanent supply of determination and "stick-to-it-ive-ness."

Fig. 1. A Well Equipped Work Bench



of industry. His interest in the world of construction and artisanship is awakened, for he has himself become a part of it. But, best of all, he is forming habits of self-reliance, perseverance, and thoroughness that will stand him well in hand, no matter what vocation the later years of his life may call him to take up.

Now it is not essential to have an extensive equipment with which to

Assuming that my young reader has the first and the last two of these items, let us secure the others and begin doing and making things.

While it will be possible, later, for you to make your own work bench, you will need one almost at the start.

For this reason it will be the best plan to have one made by some local carpenter or, better still, to secure one similar to the one shown in Fig. 1,

*About
the Work
Bench*

which is the kind used in all vocational training schools. Your local hardware dealer will secure one for you. If you have one made, it should be about 5 feet long by 2 feet 4 inches wide by 2 feet and 8 inches high, and a side vise and a tail vise similar to those shown in Fig. 1 should be provided. The tail vise should have an adjustable peg in line with a row of peg holes in the bench top. Place the bench where there is good light and fasten it securely to the floor.

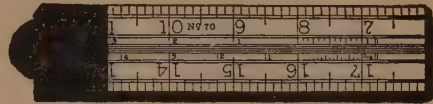
To start with, obtain from your hardware dealer, in a good quality, the following tools: a 16-ounce, bell face, adze-eye hammer; a 2-foot fourfold ruler; a carpenter's steel square; a try square with 6-inch blade; a marking gage; a jack plane or short jointer; a 14-inch, corrugated bottom, iron jack plane; and two hand saws—one a 24-inch, 7-point, crosscut saw and the other a 26-inch, 5½-point, rip saw. You can see by the illustration the exact size and shape of the teeth and the difference in appearance in these two saws.

Just a word about your plane and how to remove the blade for sharpening. The bottom is called the *sole*, the front end the *nose*, the back end



Bell Face Claw Hammer

Face



2-Foot Four Fold Rule



Carpenter's Steel Square

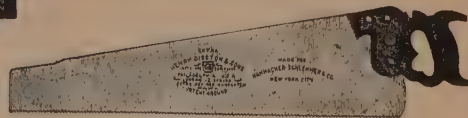


Try Square



Marking Gage

Jack Plane or Short Jointer



Hand Saw

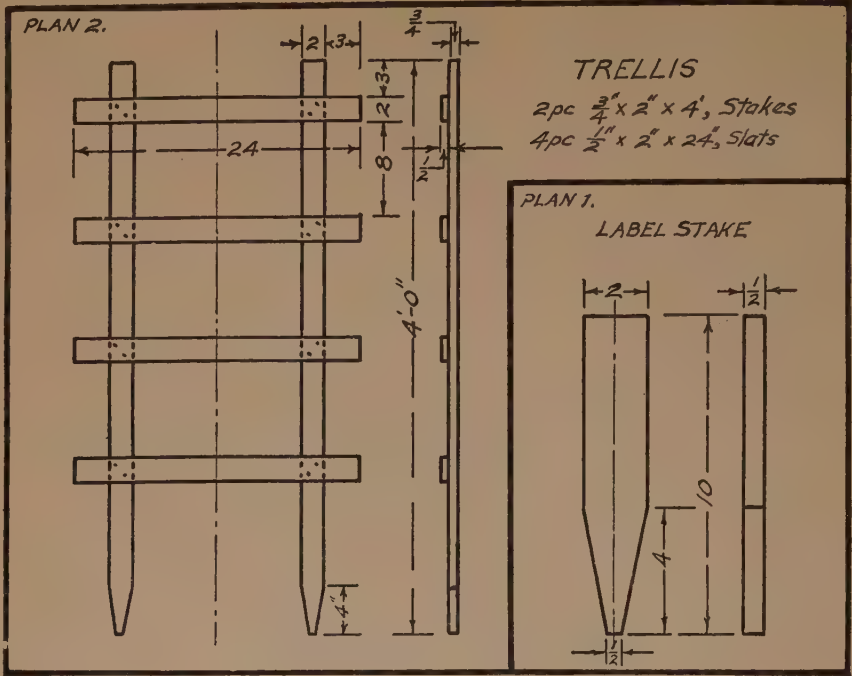


7 Points Crosscut



5½ Points Rip

Saw Teeth Shown Full Size



Garden-Line or Clothes-Line Winder

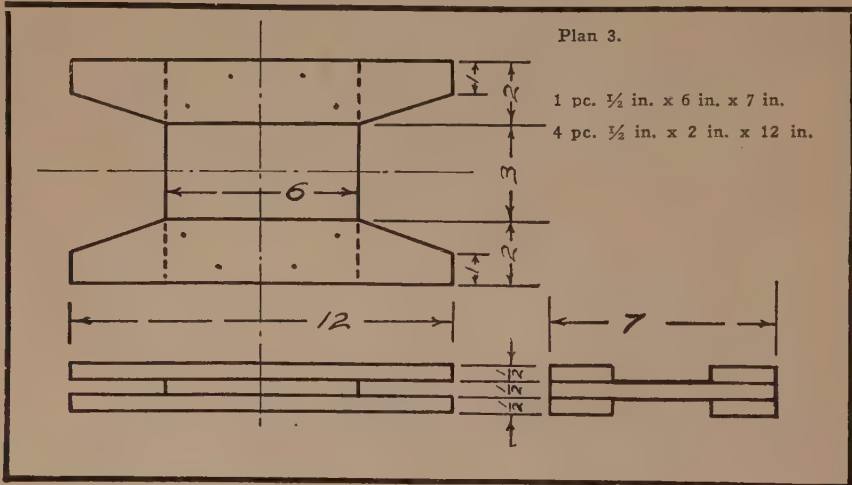


Plate I

Plan 1. Label Stake.

Plan 2. Trellis.

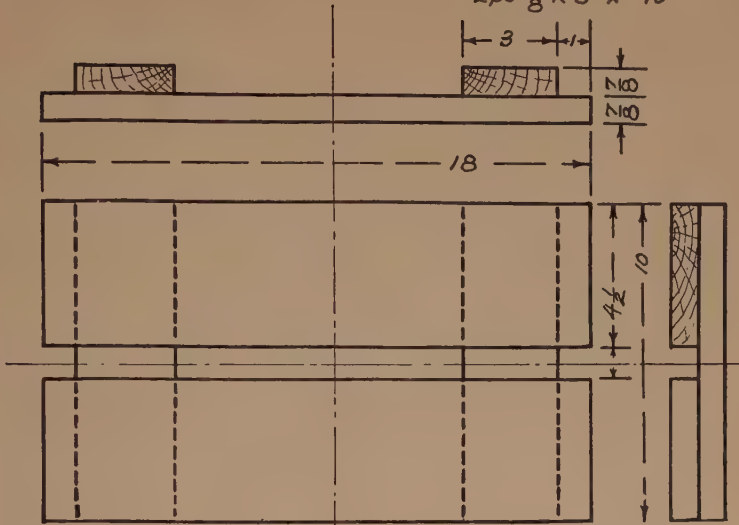
Plan 3. Garden Line.

PLAN 4.

SWING SEAT

2pc $\frac{7}{8} \times 4\frac{1}{2} \times 18$

2pc $\frac{7}{8} \times 3 \times 10$



ONE BUSHEL CRATE

14pc $\frac{1}{2} \times 1\frac{1}{2} \times 19\frac{3}{4}$, Slats

2 " $\frac{7}{8} \times 8\frac{1}{2} \times 14$, Ends

2 - $\frac{7}{8} \times 1\frac{1}{2} \times 6$, Handles

Birch or Maple

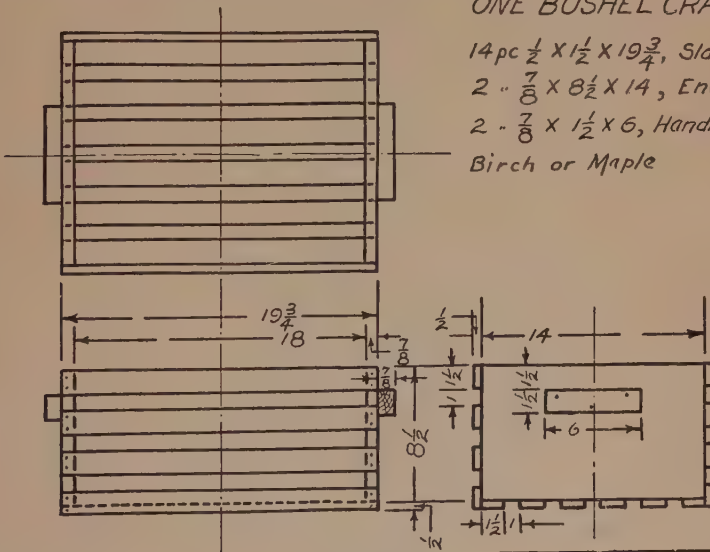
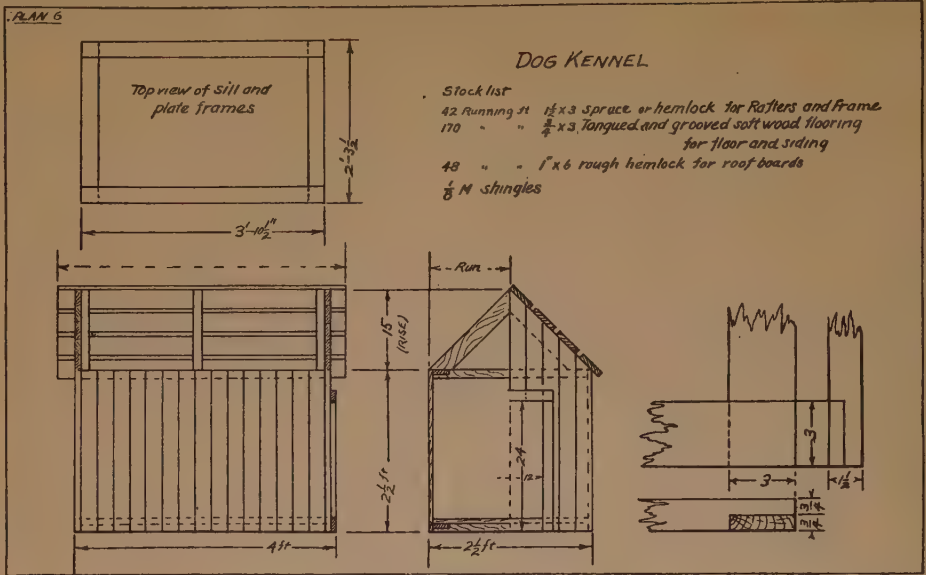


Plate II

PLAN 4. SWING SEAT

PLAN 5. ONE BUSHEL CRATE



the *heel*, the opening for the shavings the *throat*. Underneath the handle is the set-screw which "drives" or "draws" the blade so that it will take a thick or thin shaving. Above the handle is a little lever that sets the blade edge squarely across the sole. The part that holds the blade in place is called the *wedge*. To remove this, release the little lever at its top. The blade and cap may now be taken out. The purpose of the cap, which is fastened to the top of the blade, is to break or curl the shaving. The plane would not cut smoothly without it. The

Setting a Plane Blade

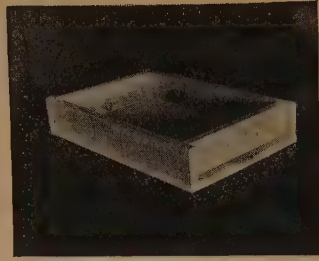
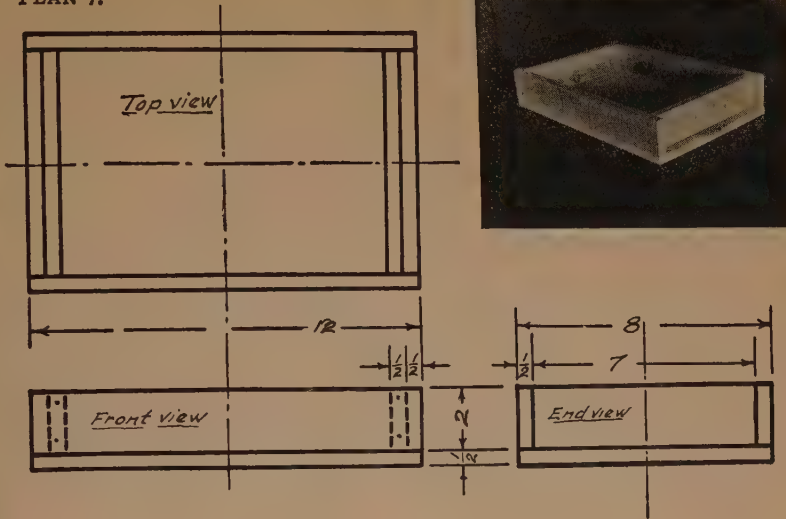


After a plane blade has been sharpened, it should be fastened to its cap and very carefully replaced in the plane to avoid dulling the edge. After the wedge is locked in place with the setscrew underneath the handle, adjust the blade so it will project only a hair's breadth below the sole.

space between the edge of the cap and the edge of the blade should be about $\frac{1}{16}$ of an inch. To remove the cap-screw, use the point of the wedge as a screw-driver. Separate the cap and blade, sharpen the latter and adjust for work as explained in Fig. 2.

To start you will need to have some local mechanic sharpen your saws and jack plane, for these tools are never properly "fitted" when they come from the hardware store. But soon you will be able to "fit" your own plane blades and other "edge tools," which is

PLAN 7.



PLAN 8.

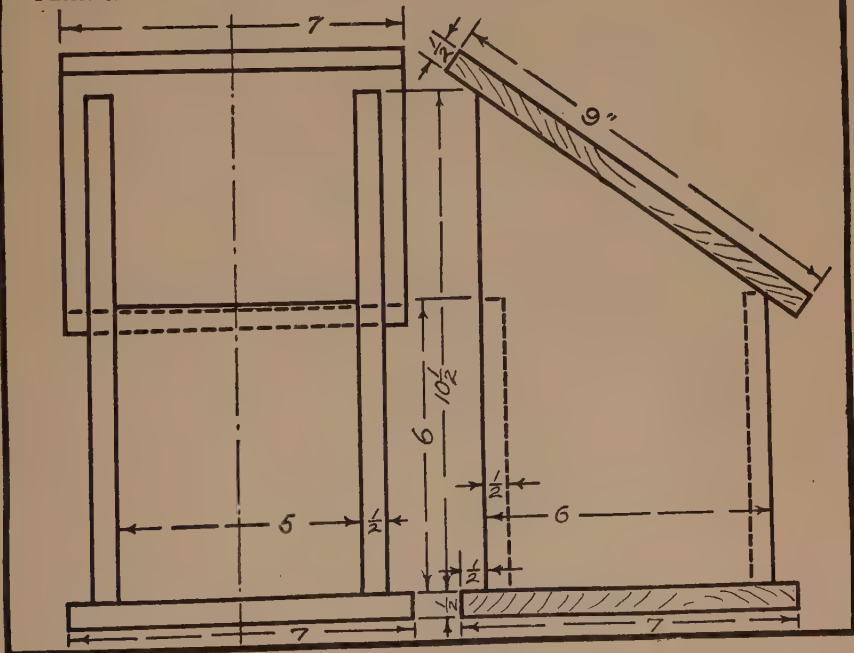


Plate IV

Plan 7. Seed Germinating Box.

Plan 8. Bird House.

as shown below in Figs. 3 and 4.

Nails are known as common nails—those with large flat heads, and finishing nails—those with small

Kinds of heads that can be set
Nails even with the surface.

You Need As to size, they are called
"2-penny," "3-penny," and so on.
You will need a small quantity of 2-,
3-, 4-, 5-, 6-, 8-, and 10-penny in
both kinds. Label each package.

kinds to secure from the lumber
yard. Have the lumber "dressed"
on two sides to the thickness desired.

A good convenient supply will in-
Study clude some $\frac{1}{4}$ ", $\frac{3}{8}$ ",
Your $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", and $\frac{7}{8}$ ".

Stock List Notice the stock list with
each drawing. For some of the pro-
jects, especially the pieces of furni-
ture made from oak, it will be best
to have the stock cut to the dimen-

Figs. 3 and 4. How to Hold Chisels and Plane Blades to Sharpen



These illustrations show clearly how to hold chisels and plane blades to sharpen on the oil stone. Where only one stone is used it should be of medium grit. It is better to have two—one coarse for rapid sharpening and the other fine for finishing. Sharpen with a rotary movement on the bevel side of the tool as in Fig. 3. Keep the bevel flat on the surface until nearly through, when the handle may be raised a trifle for the last two or three strokes.

A rough-turned edge will be produced, which must be reduced as indicated in Fig. 4. Be sure to keep tool perfectly flat on stone. Beveling the tool on this side will spoil it. You may have to reverse the tool several times before you obtain a smooth edge. The last strokes should be very light ones from the bevel side.

Keep the points of chisels square. The points of plane blades should have the corners a little shorter than the center.

After tools have been "stoned" until the flat bevel has been destroyed or much shortened, they must be reground.

In this way you will soon learn to know the various sizes at sight. Later you can make some boxes with compartments to hold nails, screws, and other small hardware.

The Supply of Lumber

As to the lumber, for the first roughly finished out-of-door things

Packing some inexpensive soft
Boxes wood will be best. Some-
May Do times packing boxes that
can be had from the local stores can
be used, but be sure to remove all the
nails. Basswood, spruce, and "sec-
ond-growth" soft pine are the best

sions here given at the mill.

How to Read Working Drawings

Speaking of drawings, if you have ever observed carpenters or mechanics at work, you have no doubt noticed the "blue prints" to which they constantly refer for directions. These blue prints are working drawings that give dimensions and all other information needful for construction. As it will be necessary for you to work from such drawings, suppose we next learn to read working drawings.

In Plate IV, Plan 7, is a photo-



Fig. 5. Using the Crosscut Saw

This boy has a very good working position for sawing. Notice the direction of the forearm—straight with the saw. In starting the saw, steady it against the left hand and touch the wood but lightly. In cutting off long heavy pieces be careful that they do not split off at the last of the cut.

graph of a box suitable for soil in which to plant seeds in the early spring, and the working drawing of this box. Notice that there are three views, the top, the front and the end. Sometimes objects may be fully described by only two views, as the label stake in Plate I, Plan 1; others need section views and detail sketches, as the dog kennel in Plate III, Plan 6. Notice that all the edges that can be seen from any one of the three view points are represented in that view by full heavy lines. Edges that are invisible are com-

*The
Meaning
of the Lines*

posed of short, heavy dashes, e. g., in the front view the invisible ends of the end boards. Examine other drawings for visible and invisible lines and think out what they mean. Fine lines made up of a long dash and a

small dot are center lines. Note their location in each view. The broken medium lines with arrow heads at each end are the dimension lines and are drawn between the extension lines. In the dimension lines are placed the dimensions that show the sizes of each piece and other measurements needed in putting the box together.

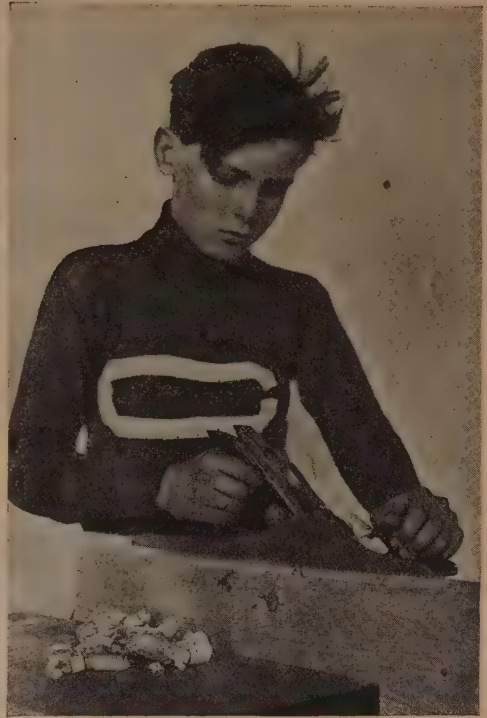


Fig. 6. Edge Planing

In edge planing, or "jointing" as it is often called, assuming that your plane is properly sharpened and set, grasp it firmly in the manner shown in the illustration. Begin with the nose only, on the end of the surface to be worked, so that the blade may begin to cut at the very end of the board. Press on the front end at the beginning of the stroke and on the rear end of the plane at the close of the stroke. Take strokes the entire length of board. You will not get a shaving the whole length until several strokes have been made. A thin shaving the whole length will indicate that the edge has been jointed. "Sight" along it as you would along a gun to see if it is straight. If you carelessly allow the plane to drop at either end of stroke it will be high in the middle; do not worry over making it hollowing.

If testing with the try square shows one side to be higher than the other, move (do not tip) the plane over so the middle of the blade will reduce the high edge.

Fig. 7. Testing Trueness



This illustration shows the method of testing edge of board with corner of plane to see if edge of board is straight.

Study these dimensions until you discover the facts given in the stock list. Find how far the end board is placed from the end of the box. Notice that when similar dimensions are alike, they are not repeated; for example, thickness is shown on but

one side board. Sometimes if the stock of an entire project is all of the same thickness, that fact is stated in the stock list and omitted from the dimensions on the drawing.

How to Use Your Tools

To explain the use of tools in written language is very difficult, so you must examine carefully the pictures of the boys at work, Figs. 5, 6, 7, 8, 9, 10, 11,

12, 13, and 14. Notice particularly

*Notice How
These Boys
Are Doing It*

the position of the boys, of their hands, and of the tools and lumber.

Study the note of instruction under each picture and whenever you get a chance watch carp-

Fig. 8. Testing With Try Square



This shows the method of holding the try square for proving if a surface be squared with the face of the stock and true. Hold the handle of the square firmly against the face side or edge, draw the tool along the length of the piece, watching if the blade touches the surface evenly at all points.

If the surface proves inaccurate, carefully reduce the high places with the plane. This boy is making a table post. Notice that he has glued three thin ($\frac{3}{4}$ -in.) pieces together to get the required thickness. The joints should be cut in the "faces" of the stock.

Fig. 9. Marking Gage



The marking gage is one of the hardest tools to learn to use. When the tool is new the spur should be filed to a knifelike point which projects through the beam about $\frac{1}{8}$ -in. File the outer side of the spur perfectly flat, parallel to the surface of the head and the inner side slightly rounded away from the head.

Having the gage set with the desired distance between the spur and the head, grasp it as shown in the illustration. Keeping the head firmly against the face edge of the stock and the farther lower corner of the beam in contact with the surface of the stock, lower by a turning movement, until the spur is lightly in contact with the wood. Push the gage from you.

Fig. 10. Using the Rip-Saw



This is the best position in which to hold a board to make a cut lengthwise. Short pieces are, however, cut most conveniently if fastened in a vertical position in the vise of the bench. Always leave a small space between the saw and the line. Be sure to cut squarely through the board. A try square held back down near the side of the saw will help you to do this.

Notice the boy's general position and the angle at which the saw is running with the wood. Do not crowd or bear on the saw; if it is properly filed, it will run straight and cut rapidly without pressure.

To correct the direction of the cut twist the saw lightly; do not bend it.

Fig. 12. How to Hold Try Square



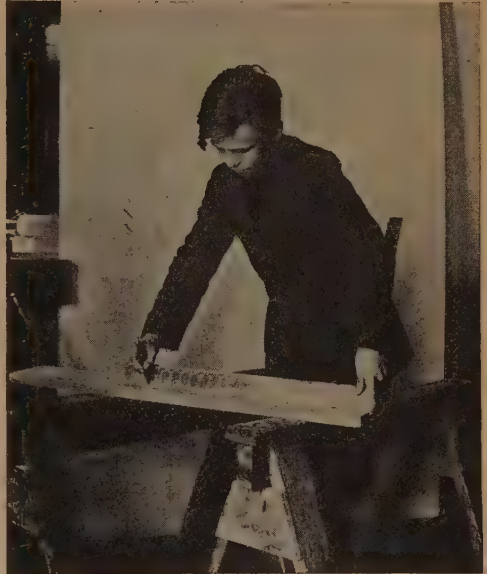
This shows the manner of holding the try square for laying out a line across the stock. As the edge of this board is still rough, it will be used for a piece of rough stock. For finishing cuts or for joints, one side and one edge of the lumber must be planed straight and square and used as "face side" and "face edge" from which all measuring and squaring must be done.

For fine, accurate work, as in cutting joints, learn to draw lines with a sharp knife-point instead of with the pencil.

ters at work and learn from them.

Now let us "get out a piece of stock," say for the garden stake in Plate I, Plan 1. This you will see from the drawing, is $\frac{1}{2}$ " $\times$ 2" $\times$ 10" (thickness by width by length). Select a board the right thickness and with a crosscut saw, Fig. 5, cut

Fig. 11. Measuring



This boy is measuring the length of a piece with the steel square. He would proceed in the same manner if he was using a ruler. The important thing is to have the ruler on edge so the markings on the scale are close to the surface of the stock.

Have your pencil well sharpened and *be accurate*. Sometimes for very particular work a knife-point is better than a pencil.

off a piece about an inch longer than the finished stake. Fasten this in the side vise of your bench as in Fig. 6, and plane the edge straight and square. When you have the edge right, measure off the width with the marking gage, Fig. 9, and with the rip-saw, Fig. 10, cut off the piece, leaving about $\frac{1}{8}$ inch between the saw and the gage line. Plane to the gage line; do not plane beyond it. Learn now, once for all, how to re-

Fig. 13. Nailing



This boy is nailing a box together. Notice the way in which he holds his hammer. For light nails the hammer should be swung with the wrist; for heavier work the whole forearm is used. Try to hit the nail squarely on the head with the bell face of the hammer and send it in even with the surface without bending the nail or marring the wood. Use much care in placing nails so they will not come through.

spect your lines; if you cut them out, you are lost and your work is wrong for you will have made it too small. Last of all lay off the length with ruler, pencil, Fig. 11, and try square, Fig. 12, so as to cut off both ends square with the crosscut saw.

This is the complete process of "getting out a piece of stock" by hand. It must constantly be repeated, so you must learn it perfectly at this point.

Teach Yourself Thoroughly Where there are to be several pieces of the same width, as in the trellis, Plate I, Plan 2, get out stock all in one long piece, then cut to length.

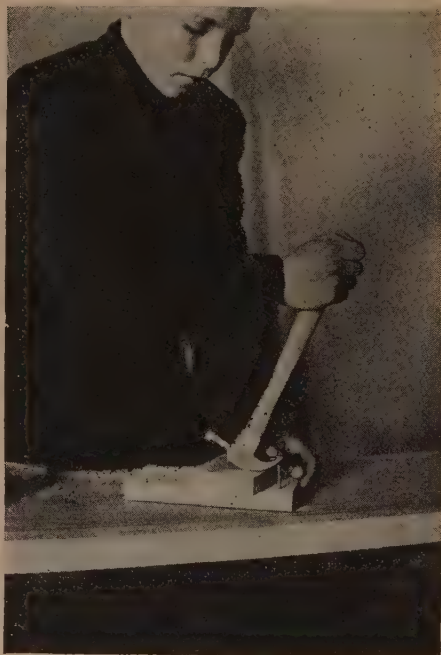
To finish the garden stake, lay out the lines for sharpening, cut nearly to them with the knife or rip-saw,

and finish with the plane. Make several stakes for practice, endeavoring to get them all alike. Learn to be accurate. Be satisfied with nothing that is wrong.

The only new work on the trellis is the nailing, Figs. 13 and 14. In nailing, observe the following rules: When fastening to the side grain use nails twice as long as the thickness of the piece you nail through. In fastening to the end grain, use nails three times as long as the thickness of the piece you nail through. Pairs of nails should be "toed together." You will readily see that they will hold much better than if driven

Mistakes to Avoid

Fig. 14. Drawing Nails



If a nail takes the wrong direction, do not bend it; that will only make a bad matter worse. Nails which get a bad start or that are bent in driving should be withdrawn and new ones driven, usually in a new place. In drawing long nails, place a block, as shown, under the hammer head; this will prevent breaking the handle.

In driving nails in hardwood, they bend very easily. They may be driven more easily if first rubbed on a cake of soap.

straight. Never nail closer than absolutely necessary to the ends of stock; it is very apt to split. For the same reason never drive two nails close together in the same longitudinal grain of the lumber.

In nailing the trellis, be sure it is square. Nail on the end of cleats first. Observe the arrangement of the nails indicated on the drawing. Use 2-penny common nails, which you will find about the right length according to the rule in the last paragraph.

The garden line winder, Plate I, Plan 3, and the swing seat, Plate II, Plan 4, present no new processes, but call for increasing skill and accuracy in those already learned. Nail the cleats of the swing seat to the top boards. This will bring the nail heads on the under side out of sight and where they cannot, by coming loose, tear clothing.

If several of the bushel crates are to be made, Plate II, Plan 5, it will be best to have the stock cut at the mill to both the width and thickness required, leaving only the length for you to cut by hand. Nail on the bottom slats first, being sure to keep the work square. In nailing the side slats, remember the rule for nailing to end grain.

Now for a Dog Kennel!

The dog kennel, Plate III, Plan 6, is rather a large and ambitious project but its dimensions may, of course, be changed if desired. Note that the drawing gives only the essential measurements. The front view is half-section to show rafter plate, floor, and sill. Only half of the door opening and casing is

shown. Roof boards are shown on the right side only and the shingling is omitted entirely. Notice that the top view, or plan of the plate and sill frames, is smaller than the outside dimensions of the kennel by twice the thickness of the siding stock. Details of the corner half-lap joint for these frames is given on a larger scale in the right lower corner of the drawing. Cut these joints out with the two saws.

Make the plate and sill frames first, then lay the

floor on the latter. Drive the flooring firmly together with a short waste piece, fitting its groove over the tongue of the board last put in place. Blind nail through the tongue, or rather in the corner at the base of the tongue, into the frame with 6-penny common nails, slanting the nails so that when fully driven they will draw the boards firmly to-

Fig. 15. Rafter Cutting



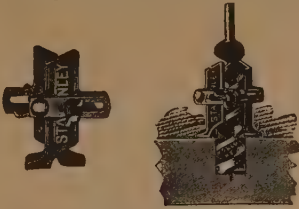
This cut shows the method of laying out rafters, saw trestle legs and other similar cuts with the steel square. The picture is almost self-explanatory. The rise is always the vertical dimension and the run the horizontal. The cuts are indicated by the black lines across the stock by the blade and tongue of the square.

gether. This is called "blind nailing" because when the next board is laid, its grooved edge, fitting over

the tongue of the preceding board, covers the heads of the nails. All floors are thus laid as you will see if you examine them for head nails.

Study carefully Fig. 15 with the explanatory note and then cut the three pairs of rafters. The rim is half the outside width, the rise is height from plate to peak. Nail them in place on the top of the plate frame and nail their tops together. Next, put siding on the ends, allowing the boards to project above end rafters, afterwards cutting them off "flush" (even) with the top of rafter, using the crosscut saw. In putting on the front, the four boards above the door go on first, then those on each side. Put on the door casing, the threshold, and casings on the corners of the kennel, if needed. Last of all, put on the roof boards—those at the peak first, then those at the eaves. Place the others so that the spaces between the boards will be reasonably even.

Allow the shingles to project over the roof boards one inch all around. Lay the shingles 4 inches "to the weather." Begin with a shingle at each lower corner. Between these stretch a cord one inch from the edge of the roof board. Nail the first course so that the "butts" extend about two inches below the cord. Use two nails in each shingle and drive them so that their heads will be covered by the next course. Leave a space of about one-fourth inch between shingles to provide for swelling when wet. Nail the second course with the butts even with the cord and be sure to "break joints," i. e., the shingles of the last course must cover the cracks of the course beneath it. Strike a line 4 inches above butts of second course and lay



Bit Gage



Wing Dividers & Compasses



Iron Miter Box and Saw



Tanged Firmer Chisel



Round Mallet



Sliding T-Bevel.



Expansion Bit



Screw Driver

*Shingling
the Kennel
Roof*

the butts of third course to this line. Proceed in this way until entire side is shingled, then even off the peak and eaves with the crosscut saw. Finish at the peak of the roof with a pair of $\frac{1}{2}$ " $\times$ 4" ridge boards; the last course of shingles being left at least 8 inches to the weather.

Get a $1\frac{1}{2}$ -inch flat brush and a quart of "outside" house paint of any color you like and give the kennel three coats, allowing about 36 hours for each coat to dry. Read and follow the directions given on the can label. Brush lengthwise the boards and see how evenly you can spread the paint. Do not paint the shingles.

Now You're a Real Carpenter

By this time you have enough experience to plan and build a number of things, such as chicken coops, rabbit hutches, hen's nests, bird houses, plant boxes—things whose parts may be cut accurately enough to be practical with the tools you have and which may be nailed together. Now let us get some more tools and attempt some projects that will require finer, more accurate work and different method of fastening.

You can now use quite a large ad-

ditional equipment to good advantage and the following list should be secured if possible:



Smooth Plane



Bit Brace



Auger Bits in Sets



Nail Set



Turning Saw



Iron Spokeshaves



Compass Saw



Draw Shave



Coping Saw



Carriage Makers Iron Clamps



Twist Drill for Wood

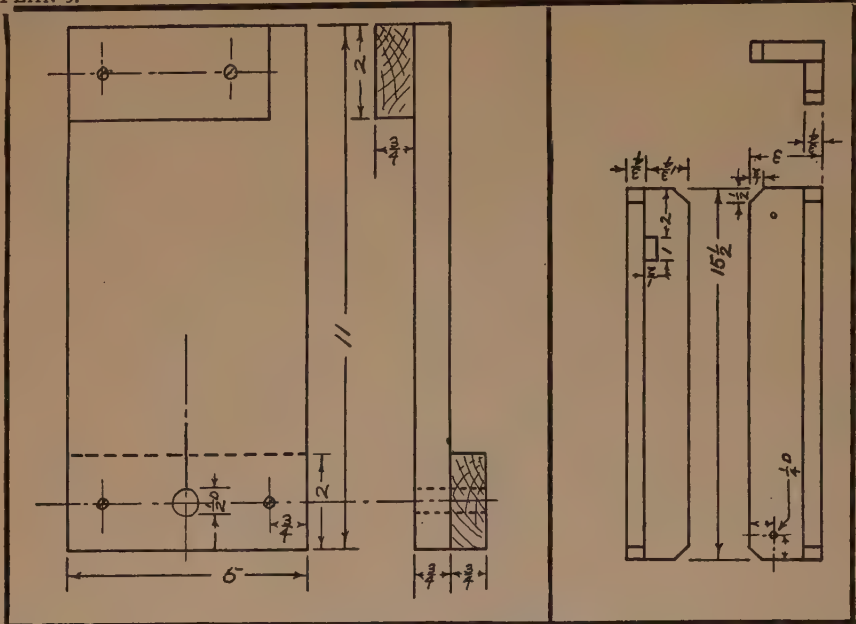


Rose Counter Sink

- 1—10-inch smooth plane
- 1— $\frac{1}{8}$ -inch nail set
- 1— $\frac{1}{8}$ -inch bradawl
- 1—pair wing compasses and dividers, 8-inch
- 1—compass saw or pad saw (for outside curves)
- 1—12-inch turning saw (for inside curves)
- 1—coping saw (for curves on thin stock)
- 1—spoke shave (for smoothing curves)
- 1—10-inch half-round wood file
- 1—iron miter box with 24-inch back saw
- 6—tanged firmer chisels as follows:
 $1\frac{1}{2}$ ", 1", $\frac{3}{4}$ ", $\frac{1}{2}$ ", $\frac{3}{8}$ ", and $\frac{1}{4}$ ".

PLAN 9.

PLAN 10.

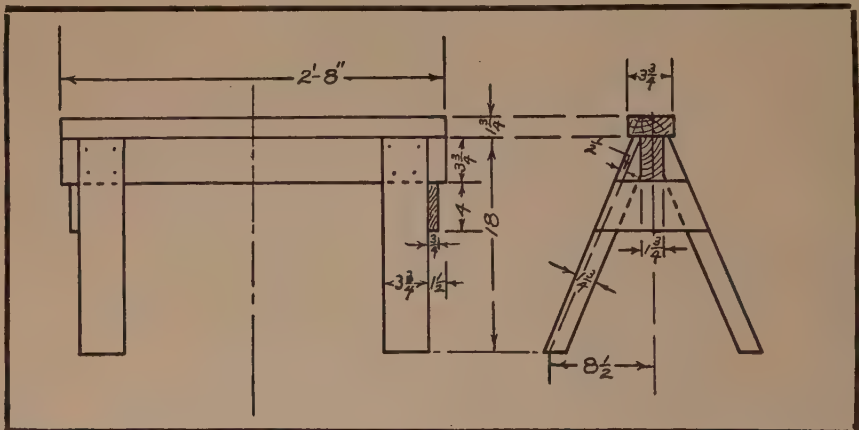


PLAN 9. BENCH HOOK
Stock list, soft pine or whitewood

Bench board, 1 piece.....	Inches $\frac{3}{4} \times 5 \times 11$
Cleats, 1 piece.....	$\frac{3}{4} \times 2 \times 10$

PLAN 10. TOOL RACK
Stock list, basswood or whitewood

Back, 1 piece.....	Inches $\frac{3}{4} \times 3 \times 15\frac{1}{2}$
Shelf, 1 piece.....	$\frac{3}{4} \times 13\frac{1}{4} \times 15\frac{3}{4}$



PLAN 11

Plate V

Plan 9. Bench Hook.

Plan 10. Tool Rack.

Plan 11. Saw Trestle.

PLAN 11. SAW TRETTLE

Stock list, hard pine

Top, truss piece and legs, 14 running feet of 2×4 in. dressed four sides to $1\frac{3}{4} \times 3\frac{3}{4}$ in.
Brace boards, 1 piece, $\frac{3}{4} \times 4 \times 22$ in.

- 1—round hickory mallet with 3-inch face
- 1—carpenter's draw shave, 10-inch
- 1—6-inch T-bevel
- 2—4-inch iron carriage-maker's clamps
- 2—6-inch iron carriage-maker's clamps
- 1—10-inch screwdriver
- 1—8-inch bit brace (ratchet brace preferred)
- 1—bit gage
- 1—set of auger bits, 13 in all, as follows: $\frac{1}{4}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", $\frac{7}{16}$ ", $\frac{1}{2}$ ", $\frac{5}{8}$ ", $\frac{3}{4}$ ", $\frac{7}{8}$ ", $\frac{15}{16}$ ", and 1"
- 1—expansive bit for large holes
- 4—twist drills for wood as follows: $\frac{1}{8}$ ", $\frac{5}{16}$ ", $\frac{3}{8}$ ", and $\frac{7}{16}$ "
- 1—counter-sink (for screw heads)

Making Seed Boxes and Bird Houses

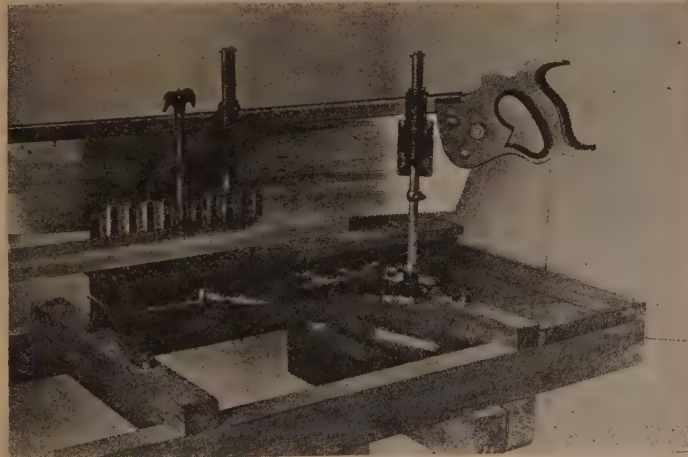
Now let us make the seed germinating box, Plate IV, Plan 7. Cut out the stock in the usual manner except that the ends of the pieces should be cut in the miter box, Figs. 16 and 17. This will enable you to be very accurate—a prime necessity in all the coming projects. If this box is to be painted, which, of course, it should be, smooth the sides of the pieces very lightly with the smoothing plane, Fig. 18, and

Fig. 16 and Fig. 17. Use of Miter Box and Saw



These two pictures explain fully the use of the miter box and saw. In Fig. 16 a square cut is being made while Fig. 17 shows the method of making a "miter" cut. Note the iron clamp. This is a good way to hold large work firmly in the box for cutting.

You will find this tool one of the most useful of all.



sandpaper with No. 1 sandpaper, Fig. 19. Nail the side on with finishing nails and set the heads a bit below the surface with the nail set. Fill the holes, after the first coat of

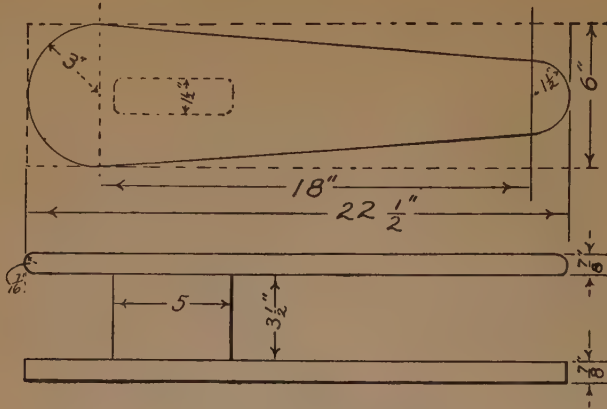
paint is dry, with putty.

You will find that building a box that is correct to dimensions and square is no "snap." Perseverance and carefulness will, however, win success. This form of box may be adapted by varying the dimensions for al-

most any purpose for which an open box may be needed.

For the little bird house in Plan 8, cut out the two side boards in one piece, lay out the slanting edge, and

Plan 12



PLAN 12. SLEEVE BOARD
Stock list, whitewood or pine

2 pieces.....	Inches
1 piece.....	$\frac{7}{8} \times 6 \times 22\frac{1}{2}$
	$1\frac{1}{2} \times 3\frac{1}{2} \times 5$

Plan 13

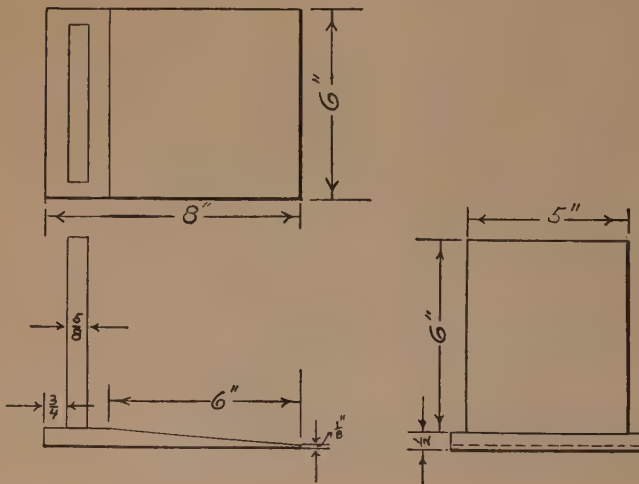


Plate VI

PLAN 13. BOOK HOLDER
Stock list, oak or chestnut

Base, 1 piece.....	Inches
End, 1 piece.....	$\frac{1}{2} \times 6 \times 8$
	$\frac{3}{8} \times 5 \times 6$

Fig. 18. Smooth Planing



This boy is using the smoothing plane to smooth the side of a board. Notice the "shearing cut," the manner of holding the work between the tail vise and a bench peg, the position of his hands, and the fine curly nature of the shavings that indicates a thin cut.



make the cut in the miter box, Fig. 17. Wherever a piece is the hypotenuse of a right triangle, the horizontal base of the triangle is called the run and the vertical side is the

Fig. 19. Sandpapering



Sandpaper varies in coarseness from 00 to No. 2. The grade is marked on each sheet. Never sandpaper until all tool work is done, for the grit of the sandpaper will dull the tools. You will find 0 and $\frac{1}{2}$ the best grades for most work. Tear each sheet over the sharp edge of the bench or piece of work through the center lengthwise and crosswise. Fold the pieces thus made once and use them wrapped around a small block as shown. Work lengthwise the grain, and be careful not to sandpaper the work out of shape. Shape your work with tools, smooth it with the sandpaper. Notice the position of the plane lying on the back of the bench. When not in use, planes should be laid back in this position, thus protecting both the bench top and the edge of the plane blade.

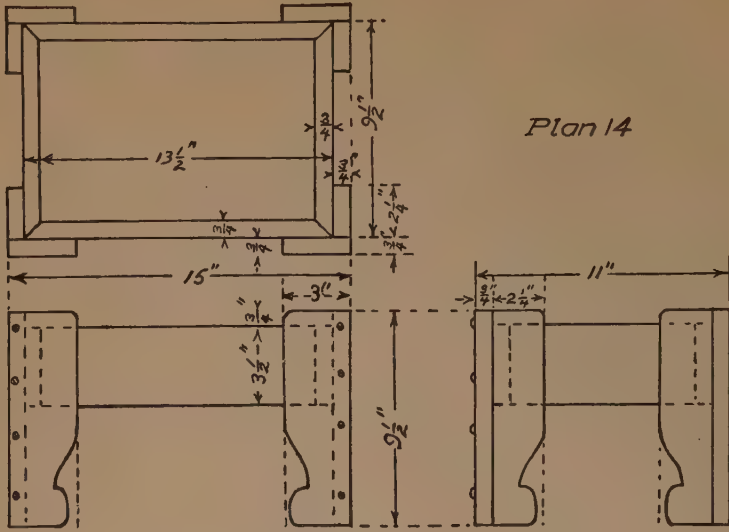
Fig. 20. Boring with the Auger Bit

There are two ways of holding a bit and brace. This is the horizontal position and permits of greater pressure being used, as is sometimes necessary in hard wood. In soft wood the spur will draw the bit in without any additional help. Try to bore straight through; it will require some experience.

If the bit is forced entirely through from one side, it will make an ugly split on the back. To avoid this, bore until the bit pricks through, then turn the board around and finish the hole from the other side.

Twist drills for wood are used in about the same manner, except that it is unnecessary to reverse the work to prevent splitting.

In laying out work for boring holes, locate the centers.



Plan 14

Plate VII
PLAN 14. FOOTSTOOL

COMBINATION
WHISK BROOM HOLDER and NECKTIE RACK
Scale, 6" = 1'

STOCK LIST	Basswood
Back 1	2" x 5 x 8
Guides 2	2" x 1 1/2 x 4 1/2
Rail 1	2" x 1 x 14
Cross Bar 1	2" x 1 1/2 x 5
Template 1	2" x 4 1/2 x 5

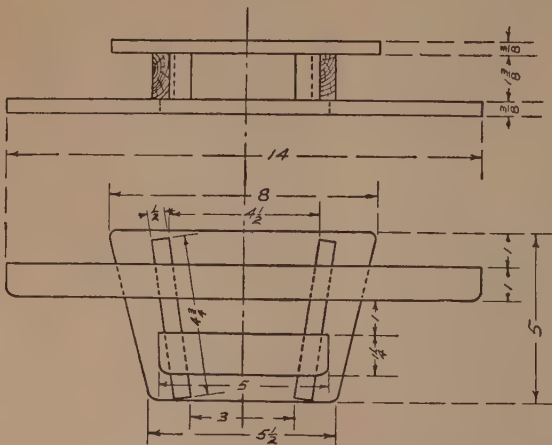


Plate VIII
PLAN 15. COMBINATION WHISK BROOM HOLDER AND NECKTIE RACK

rise. Instead of the opening left above the front board, the front may be all closed up and a hole bored

Fig. 21. Setting Screws



This boy is setting screws. Notice the position of the forearm, the hand, and the screwdriver.

Never try to force screws in without having first made the holes for them. Either you will twist them off if the wood is hard, or you will split the wood if near the end and the wood is soft.

Flat-head screws should have the holes countersunk so the heads will be even with the surface when they are driven home.

The tip of a screwdriver should be kept square and the sides flat. Never sharpen down a large driver to fit a small screw. The slanting sides thus made will slip out of the kerf in the screw-head and the driver will be practically useless.

with the expansive bit for the door. (See boxing with the augur bit, Fig. 20.)

Making Workshop Equipment

Plans 9, 10, and 11, in Plate V, are for workshop equipment. The bench hook is to hold work and protect the bench top. Its construction introduces you to the setting of screws. Screws should be much more carefully located than are nails. First, with a drill as large

as the screw (in diameter), bore a hole through the top piece; with the countersink, fit this hole to the screw head. This applies only to flat head screws; round head screws are never countersunk. The screw should go into the second place about one-third its length. In hard wood, a hole should be made the full depth with a drill that is about the size of the

Fig. 22. Mallet and Chisel



A large part of work with a chisel may be done with the "paring" cut, holding the handle in the palm of the right hand and guiding the tool with the left. Round corners are cut with the flat side of the chisel down; for hollows use the bevel down. Take small cuts.

For heavy work drive the chisel with a mallet; never use a hammer, as it spoils the chisel handle. This boy is making a half joint or a notch, as for the tool rack. His work is laid out on both sides of the stock. He will work to the line, first on one side, then on the other. Observe the bench hook under the work to protect the bench top.

screw at the bottom of the threads. With the two pieces firmly held together in vise or with clamps, drive the screws "home" with the screw-

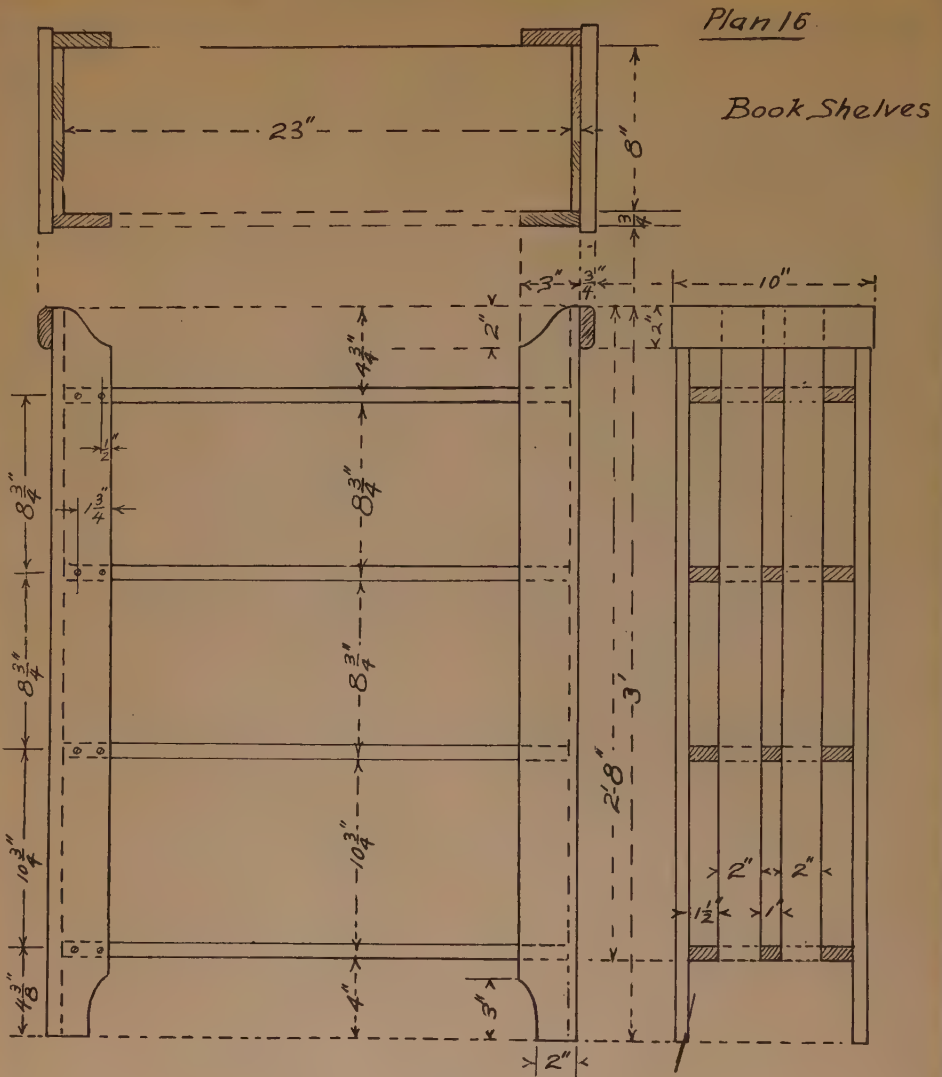


Plate IX

PLAN 16. BOOK SHELVES

Stock list, chestnut or whitewood

Shelves, 4 pieces.....	3/4 x 8 x 8
Posts, 4 pieces.....	3/4 x 3 x 36
Slats, 4 pieces.....	1/2 x 2 x 32
Top bars, 2 pieces.....	3/4 x 2 x 10

driver, Fig. 21. Bore the hole after the pieces are fastened together.

The legs to the saw trestle present the rafter problem, Fig. 15. Note

that the run is $8\frac{1}{2}$ inches and the rise is 18 inches, and that these are laid out on a line one-half inch from the edge of the stock. Make the cuts

in the miter box. Nail the stock together securely with common nails. Cut the brace boards across the ends after they are nailed in place.



Fig. 23. Filing

Notice carefully the manner of holding the file. Take each stroke from you, removing the file for the back or return stroke. The surfaces of files are made up of tiny teeth that cut with the forward stroke only, drawing the file backwards dulls them. Use the flat side of the file around projecting curves like the corner of the board in the picture. For hollows, use the round side. Test your work frequently with the try square. It requires careful work to shape curves well with a file. Do as little filing as possible; work should be cut as nearly as possible to the right shape with the more accurate tools.

The tool rack is given as a suggestion only. Very likely you will need one of very different dimensions. Arrange the notches along the back to fit the tools. Lay them out carefully with square and gage, saw the sides with the miter box, and chisel out the hole as shown in Fig. 22.

The sleeve board in Plate VI, Plan 12, should be securely fastened together by two 1½-inch screws

through both top and bottom boards. Cut out the ends with the compass or pad saw. Work the top to all the lines accurately with the edges square; then, ¾-inch from the edge, draw a pencil line on both sides and, with spoke shave, file, and sandpaper, Fig. 23, try to make the edge a perfect half circle. Lay this board out from the center line; your wing compasses will be needed for the circles.

Fig. 24. Using the Drawshave



Notice that the drawshave is held with the flat side to the work. Turn it a bit at an angle so as to obtain a "shearing" cut. You have undoubtedly learned long ago when whittling with your pocketknife that a shearing or drawing cut is the easiest made and gives the smoothest surface. Remember this principle in using any edge tool.

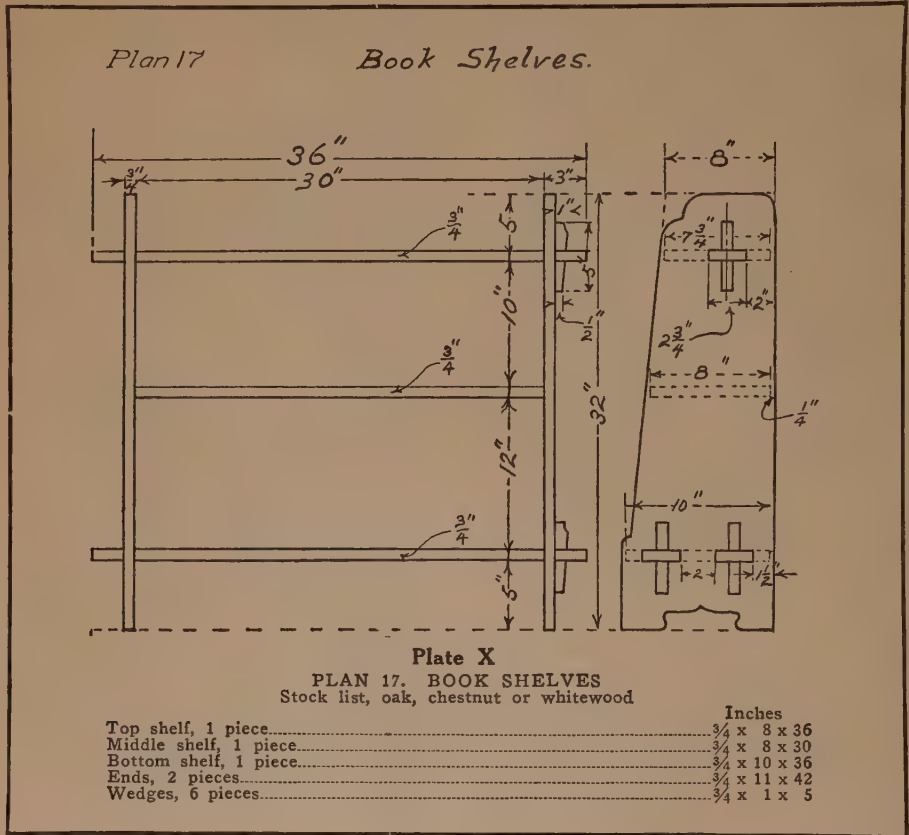
The drawshave is a convenient tool for quickly disposing of heavy cuts of waste, as in outline to the side lines of the tapering sleeve board in Plan 12.

Making a Book Holder

The vertical end of the book holder, Plate VI, Plan 13, should be fastened to the baseboard by three screws up through from the underside. As these screws go into the

end grain, they must be at least 1¼ inches long and rather small in diameter, and very carefully set, for screws, like nails, do not hold well in end-grain. Modify the shape of the end boards to any outline you may desire. Be sure that this job is nice-

put on a light coat of wax, spreading it with a bit of cloth. As soon as it begins to feel "rubbery," polish with a clean cloth. Be sure when you are through to burn all cloths used for this work, as such cloths will, in time, heat and catch fire spontane-



ly smoothed up, Fig. 23, for it is the first piece of furniture you have tried. Get a small can of wood stain (do not get varnish stain) and a small can of furniture wax. With a small brush stain the book holder all over except the bottom. As soon as the stain begins to look dull, wipe off all that you can with an old cloth. In about a half day's time

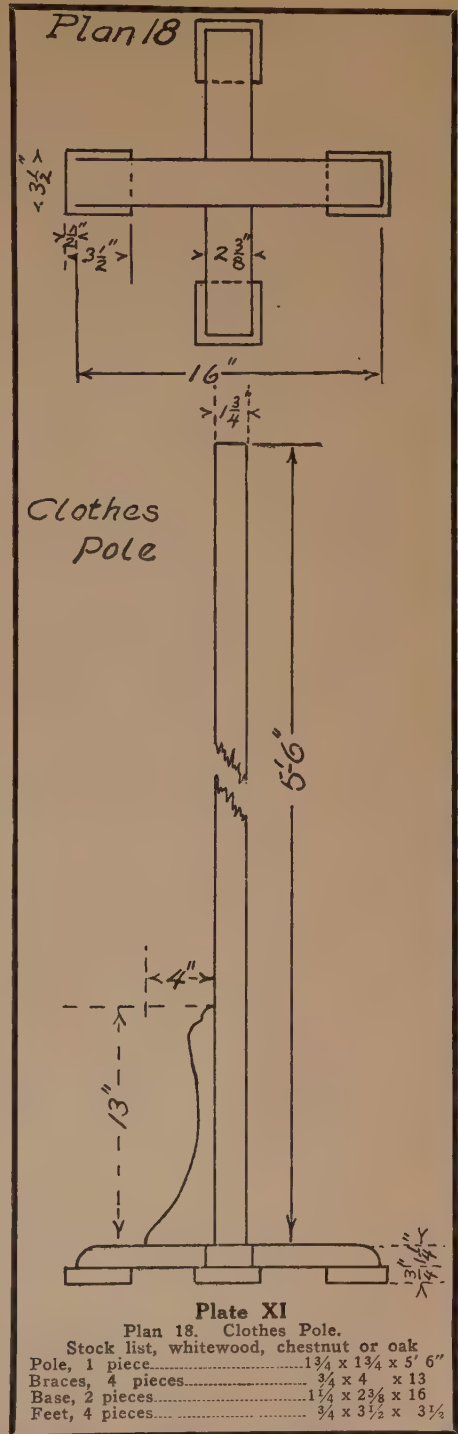
ously. Get a can of liquid glue and spread a thin, even coat on the bottom with a thin stick and cover it with a piece of felt somewhat larger in size, so that when the glue dries the felt may be trimmed even with the shears. It is a good plan to cover the bottom of any article intended to be used on a table top with felt to prevent scratching and to give a neat appearance.

This Is for Mother

The details for the frame of a footstool that is intended for simple upholstery are given in Plate VII, Plan 14. The design at the bottom of the posts may be varied to suit your ideas. Cut whatever outline you decide to use from a strip of heavy paper and use it as a pattern. After all the pieces are cut to size and nicely smoothed, first, fasten the

How to two parts of each post
Make a together with round-
Foot Stool head, blue screws;
then fasten the rails on the inside of the posts with two flat-head screws in each end of each rail. Nail a piece of leather or other suitable upholstery material on the top of the frame with the edges neatly folded under. Use fancy upholstery nails, taking pains to space them evenly. Turn the stool top down, pack in as much as the frame will easily hold of curled hair (fine excelsior will do as a substitute), fit a $\frac{1}{2}$ -inch pine board loosely inside the frame and fasten it in place with a cleat fastened along the lower edge of each end rail. Finish the stool as explained for the book holder, Plate VI, Plan 13.

The only difficult thing in Plate VIII, Plan 15, is the assembling. In doing this, work from the center line. Notice the stock list calls for a template—this is a block to fit between the guides. Fasten it temporarily in place on the back, then fasten the guides securely and remove the template. Use flat-head screws for the back and round-head screws for the front. Finish nicely with stain and wax. If you have mastered all previous



work, the set of shelves Plate IX, Plan 16, will present no great difficulties. Note the details given on the left post for the location of the screws; these are, of course, the same for all four posts. Lay out these dimensions very carefully. The holes must be made in both the posts and in the edges of the shelves as well, otherwise the shelves cannot be properly placed and will be split by the screws. Fasten the top bars to the posts with screws; the slats may be fastened with finishing nails and their heads covered with small fancy upholsterer's nails. Finish the shelves with stain and wax.

Plate X, Plan 17, is a more difficult style of bookshelves. Holes, called *mortises*, are cut through the ends to receive projections or tenons on the ends of the top and bottom shelves. Holes are in turn cut in these tenons to receive the tapering

More pins and, when driven in
Homes for place, hold the whole
Book Friends piece firmly together.

The middle shelf is held up by pins, called *dowels*, (see note under Fig. 25), inserted in the end of the shelf, holes being bored in the end boards to receive them. Lay out the work very carefully on both sides of the stock. Cut first the tenons; then the mortises through them for the pins. Be sure these are so located that the pins will tighten. In cutting the mortises, bore out as much as possible with an auger bit, then finish with a mallet and chisel. Work partly from both sides of the stock or you will split and spoil the work.

In the drawing of the clothes pole, Plate XI, Plan 18, for the sake of clearness some of the details have been omitted. The two parts of the base are crossed and at their center

a "half joint" is made. This is just like the joint described in Plate III, Plan 6, for the corner of the kennel

Fig. 25. Boring for Dowels



This boy is doing several things to take note of. First, he is using the vertical position for boring with bit and brace. Second, he has a bit gage on his bit which enables him to bore several holes all of the same known depth, and he is preparing to fasten two pieces of stock together with dowels and glue to make a wide piece for a taboret top.

Doweling is a round wooden rod obtained in $\frac{1}{4}$ ", $\frac{3}{8}$ ", and $\frac{1}{2}$ ". Three-eighth inch is more commonly used. In putting table tops and similar work together, short pieces about 2" long are used in the joints. First, make the joint using the longest plane you have, so that it will be perfect when the two edges are laid together. Then fasten together in the vise, as in the picture. Square lines across the edges, find exact center of each board on these lines, and bore holes to fit dowels about $\frac{1}{8}$ " deeper than half the length of dowel. Insert dowels in one board with glue. Put glue in the other holes and on entire surface of joint, and clamp together with bar clamps. Be sure piece is perfectly flat and leave 24 hours to dry.

frames. Fasten the parts of these shelves securely with flat-head screws from the underside of the base. Put on the braces last and fasten them to the pole with finishing nails set and puttied, or with round-head screws.

Use of the Turning and Coping Saws

For cutting the curves in the braces at the foot of the clothes pole use the turning saw, Fig. 26. The compass saw or pad saw may be used, but once the turning saw is learned you will prefer it to the others. The more gradual curves may be smoothed with the spoke shave, which is adjusted much like the block plane of which it might be called a distant relative. Tip the tool forward on its nose, set it for a very light cut, use a shearing stroke and, above all, work with the grain. Be as careful to keep curved

Fig. 26. How to Use the Turning Saw



The thinness of this saw together with the wide space between the blade and the brace enable you to cut in a circle or turn just as sharp curves as you find it necessary in cutting any piece of wood.

edges square with the sides of stock as you are to keep straight edges square. All sharp curves must be filed. Smoothing must be finished by wrapping sandpaper

around the file. The foregoing directions will apply to all curved edges.

The coping saw is used for very abrupt curves and for thin stock. It may be used to make dissected picture puzzles. For these, use pulp board $\frac{1}{4}$ inch thick (often used for interior wall covering in house building). Paste any suitable picture smoothly on this stock, cut to the edges of the picture with the cross-cut saw, smooth the edges with the plane, and then saw into any irregular pieces you may choose with the coping saw. Hold the work on one corner of a bench or table and run the saw in a vertical position. A small clamp will be of use in holding the work firmly.

Making Plans of Your Own

Having reached this point in your work with tools, you will be able to make many simple articles that you may find need for, planning them to suit your own special purposes. You will find this even more interesting than following ready-made plans. Often the best way is to work from a model of the desired article, making such changes in dimensions and construction as will better adapt it to your own peculiar use. The following are suggestions.

Weather vanes in interesting variety may be made by cutting figures of birds or animals from thin wood with the coping saw. Fasten these to a heavier bar or horizontal

base strip through which a hole is bored to receive a vertical pin upon which the vane is to revolve. To make the vane "face the wind," this hole must be nearer the front end of the vane. The pin may be a large nail or "spike" driven in the top of

Sawing Out Weather Vanes

a post. Place a washer between the vane and the post to allow the vane to turn easily.

Windwheels are mounted in the same manner as are weather vanes. The wheel may be made by half-jointing two soft wood pieces (joint used in base of clothes pole, Plate XI, Plan 18) at their centers, then

wheel may be made by using a round block of wood, perhaps $\frac{3}{4}$ inch thick by 2 inches or more in diameter, for

*Then Try
a Wind
Wheel*

a hub on which pieces of tin, properly bent, are fastened for arms. Make

the body of the model of a piece an inch or more square in cross-section and about as long as the diameter of

the wheel. To one end of the body the wheel is attached so as to revolve freely, and the other end is provided with a suitable vane or "tail" of thin wood sufficiently large to compel the model to "face the wind." Find, by trial, the point on which the assembled model will balance and through the body at this point bore the hole to receive the vertical pin on which the model is to turn.

A level and a compass are necessary instruments in constructing a sun dial. The face of the sun dial must be a perfectly level surface, preferably square, on which a line, called the *noon mark*, has been drawn running exactly north and south. The finger of the dial, called the *gnomen*, is set on this noon mark; the upper edge of the *gnomen* must be parallel with the earth's axis. To occupy

this position it must make an angle with face of the dial that is equal, in number of degrees, to the local latitude. Having the dial with its *gnomen* correctly set, the hour marks

Fig. 27. Looking Through the Periscope



Here are two periscopes that these boys made for themselves. They are made on the same principles as the ones used by soldiers in a war. The picture shows how the mirrors should be set. Make one and you will have something new next time you are playing soldier or having a snow-ball battle.

whittling or drawshaving the four arms all to the same slant. Small wheels, whose arms have rather sharply slanting faces, turn the more easily and run the faster. A good

may easily be established on any sunny day.

All out-of-door articles that are intended to resist the weather should be given at least three coats of "outside" paint.

Where a Wash Boiler Is Useful

Skis and toboggans are simple yet rather difficult projects. The difficulty lies in the bending of the wood. To do this rightly a "form" must be made, the wood being steamed until pliable and then clamped or otherwise fastened to the form until perfectly dry. The steaming will very likely prove a hard problem, but it may be done in a wash boiler, over which a canvas cover has been tied in such a manner as to hold the wood in place. The process will take several hours. It will quite likely be necessary to have your forms made at some local shop.

Before undertaking skis or toboggans, you should make a careful study of some good model. Select the best straight-grained white ash, if possible to secure it. Probably the next best wood is spruce.

Hockey sticks may be cut from birch or white maple and bent in like manner. Give such models as these three coats of good wagon or boat varnish.

Stilts are very easily made. Be sure to have strong straight wood for the long pieces; their size and length will depend upon the size and weight of the boy who is to use them. Bevel or round off the corners of these pieces and make them very smooth. Make the foot pieces the right width at the top to receive your foot; eight inches would be a good length, and they should be

tapered or curved away so that the width at the bottom will be about an inch. Attach them at whatever height you like and secure them with carriage bolts, two in each, passing entirely through both the foot piece and the pole. A broad leather strap should be so fastened (nailed) as to fit the top of the foot to hold it in place and to help in raising the stilt in walking.

The boys in the picture, Fig. 27, are looking at each other over the end of this big table through periscopes. These are the instruments used by the submarine and by the soldier in the trenches to see the enemy, without exposing himself. The "scopes" these boys have made are long hollow boxes about $2\frac{1}{2}'' \times 4''$ on the inside, constructed of $\frac{3}{8}$ -inch stock. Near each end, but on opposite sides, small holes—about $1'' \times 3''$ —are made to look through, and facing these holes small mirrors are built in at an angle of 45 degrees. The black lines drawn on the periscope at the left will show the position of these mirrors and the white lines will explain how the boy, by looking through the opening in the bottom of his instrument, can see the top of the one the other boy is using.

Kite-making is a craft in itself. The kite is really the most elementary form of the modern aeroplane. The most common and perhaps the best kite is the tailless kind. This kite may be made any desired size.

For its construction you will need two sticks, the *spine* and the *bow*, both of the same length. Basswood makes good kite sticks, being both light and flexible. The size of the stick in cross-section depends, of course,

Stilts?
That's an
"Easy One"

When
Kite Time
Comes

upon the size of the kite or upon the needed strength. Use the lightest sticks possible and secure rigidity of construction. $\frac{1}{4}'' \times \frac{1}{2}''$ will be found a suitable dimension for use in medium-sized kites. Kite sticks should be lashed together, not nailed. V-shaped grooves should be

tissue paper and cut the covering 2 inches outside of the strings. Use about $\frac{3}{4}$ inch of this extra size to fold and paste around the strings. Stretch a cord tightly from end to end of the bow. Between this cord and the bow at their centers, insert a brace stick about 3 inches long.

Fig. 28. A Miniature Telegraph System



The above telegraph system can be made up of the materials that nearly every boy can find at home, with the exception of the copper wire which can be secured at a hardware store, or from a dealer in electrical supplies. You can see from this, how to make the wet cell from an old dry cell and glass fruit jar, and how to arrange the instruments and make the connections.

cut across the ends to receive the stringing, and the sticks should be neatly wound with small cord near the ends to prevent splitting. All lashings and windings should be secured with a coat of shellac.

Suppose we have decided to build a tailless kite with a 3-foot spine. Lash the bow to the spine at the center of the former and about one-fifth the length of the latter from the end. Next, string around the frame thus made hard twisted cotton cord that will not stretch, using care to have the frame perfectly balanced and spaced. The covering to this kite must be put on loosely or the kite will be unsteady and likely to dive to destruction. Lay the strung form on a sheet of strong

The bridle is a cord fastened to the two ends of the spine and it should be long enough so that, when pulled to one side, it will reach the end of the bow. It is at this point in the bridle that the kite line is attached.

The square-box kite requires a stronger wind but has greater pulling qualities and is steadier than are its flat relatives. It is not difficult to make, if care and accuracy are used. Fourteen inches square is a good size to choose. The cell at each end should be as long as the kite is square, and the vent between the cells somewhat longer—perhaps 17 inches for a 14-inch kite. First get out four corner sticks the right length. Six inches from each end

*The
Square
Box Kite*

of each stick on one edge cut a square notch $\frac{1}{8}$ inch deep to receive the ends of the brace sticks, two of which are placed diagonally in each cell. These brace sticks should be square notched at each end to fit the notches in the corner sticks, wound to prevent splitting, and made just long enough to bow slightly when in place. To ascertain the length of the brace sticks, lay out a 14-inch square. Draw its diagonals. From the length of these diagonals subtract the combined width of the two corner sticks, then add for the notches in both corner sticks and in both ends of the brace stick.

Make the covering of the cells of two strips of thin, tough paper, 58 inches long by $15\frac{1}{2}$ inches wide. Fold over $\frac{3}{4}$ inch along both long edges. Lay a small cord in the crease and glue down the fold. Lap the ends 2 inches and glue together, making both covers exactly the same length—28 inches when folded flat. These cell covers may be made of cambric if desired. Place glue on the outer edge of two of the corner sticks for a distance of 14 inches from each end and fasten them in the opposite folds of the cell covers. Exactly in the center between this pair of corner sticks the covers should again be folded flat and the other pair of

corner sticks glued in place. Open the kite after the glue has dried and insert the brace sticks, which, if their length has been correctly determined, will make the kite rigid. To fly the kite in a diagonal position, use for a bridle a single line fastened to the two ends of one of the corner sticks. If the kite is to fly in a horizontal position, two adjacent corner sticks should be provided with bridle lines which are caught together by the kite line. The length of the bridle lines and the point at which to attach the kite line must be determined by trial, for no two kites can be made to behave exactly alike.

In fact, successful kite-making and flying require a good supply of patience and persistence, and the beginner must not be disheartened by many a defeat.

Making Edison's Playthings

The making of simple electrical devices is very fascinating but requires much special material and often the purchase of quite expensive bits of apparatus. It is, in fact, a special field in itself, related only incidentally to mechanical construction or ability. There are, however, some simple pieces easy to make from readily obtainable material that are both interesting and instructive,

Fig. 29. A Home-made Doorbell



if not exactly of practical value.

First, you will need a source of electricity—a battery. The dry cell of commerce is the most convenient form in which to obtain electrical energy. You can readily obtain these dry cells, after they have become discharged and useless, from any garage or from some of your automobilist friends. These dry cells may easily be made into quite efficient wet batteries.

First, cut off the top of a quart fruit jar. To do this, soak a piece of cotton twine in alcohol or gasoline and wind it several times around the jar where you desire to cut it off. Set fire to the string. As soon as it has burned out plunge the top of the jar in water. The two parts of the jar will quickly part company.

Remove the pasteboard covering from the dry cell and with a ten-penny nail punch twenty or thirty holes in the sides of the battery. Distribute these holes as evenly as possible. Punch them deeply enough to reach the carbon center but not deeply enough to break it.

Mix a small amount of plaster of paris with water in the bottom of the glass jar, imbed the bottom of the dry cell in the plaster and allow it to harden. Fill the glass jar to within one-half inch of the top of the dry cell with a *saturated solution* of salammoniac. Melted paraffin may be poured over the top of this solution to prevent slopping. One of these batteries is shown in the illustration of the telegraph, Fig. 28, and of the door bell, Fig. 29. It is hardly sufficient to operate these, but several such batteries may be connected in a series and will develop enough current for many uses. They

will easily produce one-half volt each, or about one-half the strength of the dry cell when new. In connecting the series, remember that the positive pole of one must be connected with the negative pole of the next (center with rim).

Making an Electromagnet

An electromagnet consists of an iron core around which an insulated wire has been regularly and evenly wound. To make a simple electromagnet, wind a common spool with No. 20 (B & S Gage) insulated wire. In starting the winding, leave enough of the first end of the wire projecting to provide for connecting with the battery or instrument. Fill the spool with the winding, which may be shellacked or covered with bicycle tape. Through the spool insert and fasten a common stove bolt; when the two ends of the winding wire have been connected with the two poles of the battery, your spool has become a magnet, the ends of the bolt being its north and south, or positive and negative, poles respectively.

Two of the simple magnets are usually connected as shown in Fig. 29, when they become a horseshoe magnet. The inner wire of one should be connected to the outer wire of the other and a bar of iron or a heavy wire fastened by the nuts on the bolts across the ends of the two spools. The positive and negative poles are then adjacent, instead of being the opposite ends of the single magnet. The horseshoe magnet may be conveniently mounted on a wooden block. A better magnet may be made if, instead of using the wooden spool, the stove bolt is covered with waxed paper and pasteboard washers are used at

each of the ends. Of course electro-magnets are not magnets except when the current is flowing through them. The more cells you have in your series, the greater the power of your magnet. Polished bits of steel like your knife blade may be temporarily magnetized by drawing them across the poles of the electro-magnet, and interesting experiments may be tried with pins, needles, and other bits of steel and iron.

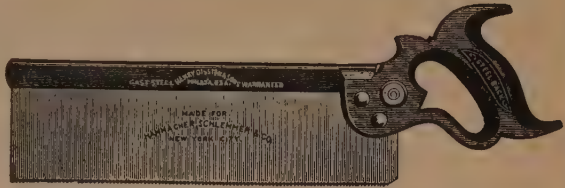
The wiring is completed by connecting the other wire of the magnet



Socket Mortise Chisel



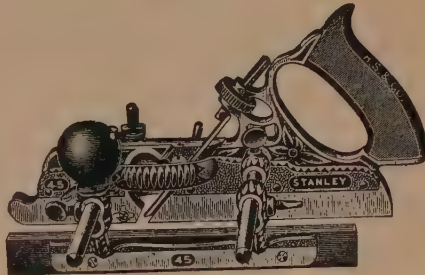
Mortise Gage



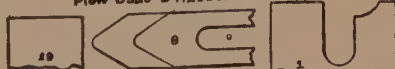
Back Saw



Cabinet Scraper



Plow Dado & Rabbit Tools.



Slitting Tool.



Sash Tool



Beading Tools.

Match Tool

Universal Plane

Now the Telegraph

There are many electrical devices that depend for their operation upon the interruption or breaking of the electric current and the use of some form of the electro-magnet. Among these are the telegraph and the electric bell.

Fig. 28 shows a very crude telegraph outfit. At the right is the key or sending instrument. This one is made of a strip of tin, the edges of which were turned over and the whole piece bent as shown, and tacked to the wooden block. A 2-penny common nail is driven through the tin by means of which the key is connected to the positive pole of the battery. A second nail is driven in such a position that when the key is pressed it will come in contact with the head of the nail. This nail is connected to one of the wires of the magnet used in the sounder shown at the left in the illustration.

with the negative pole of the battery. A flexible bit of tin, shaped and mounted as shown in the picture, completes the sounder, as the receiving instrument is called. A

*How Your
Telegraph
Works*

very small space is left between this bit of tin and the poles of the magnet. When the key is pressed, the circuit is completed and the magnet is charged and draws the sounder down, holding it until the key is released. In this way, with long and short contacts, the dashes and dots of the telegraphic code may be transmitted, the key being the sending station and the sounder, the receiving station.

Plenty of batteries should be provided so as to take care of the resistance, due to the length of an actual line between neighboring houses and to give a strong movement of the sounder. An outfit similar to this will furnish two boys with many of the rudiments of telegraphy.

Then Try an Electric Bell

The illustration, Fig. 29, shows a crude but working model of an electric bell. The whole arrangement is made quite clear by the photograph except in one particular. Remember that the bell depends for its operation upon a rapid automatic making and breaking of the cir-

cuit; then trace the wiring from the battery to the lever that operates the hammer. When this lever is touching the bent nail contact post that shows beneath the bell, the circuit is made and the magnet immediately acts by drawing the lever over to its poles and away from the bell. The lever is made of two

Fig. 30. The Tenon Joint



This shows the tenon and mortise cut and ready to be put together. In cutting your material to make this joint you must do your marking and cutting very carefully in order to make a close-fitting joint.

strips of tin, the smaller one of which the picture does not show. This strip remains in contact with the post until the hammer lever is almost in contact with the magnet, when, for a brief instant, it leaves the post, and the circuit is broken and the lever springs back, delivering the blow to the bell and again closing the circuit for another working cycle. The smaller strip of tin might be a fine wire, for it needs to be so light that it will not interfere

with the spring action of the hammer. The construction of the model would be improved if the bell were placed at the left of the hammer. You will need some patience, a carefully made magnet, and effective batteries if you make a successful bell.

For use in some of the foregoing work and for any "tinker jobs" you will naturally want to try "on your own hook," you will find a pair of side-cutting pliers, a pair of small straight snips, (tin shears) and a

"hack saw" for cutting metal, very convenient tools to own.

1—cabinet scraper with burnisher for sharpening same.

Work with Mortise and Tenon Joint

We will end this excursion into the land of "making and doing" with some pieces of work the construction of which requires the mortise and tenon joint. This joint is one of the most difficult to make but when the job of making it is done neatly and well you can feel well repaid for your labor. At this point you will need to get a few additional tools. They are as follows:

If you desire to undertake panel work or the construction of drawers

Fig. 31. Manner of Holding Mortise and Tenon Joints



Fig. 32. Sawing Out the Tenon



- 3—socket mortise chisels, $\frac{1}{4}$ -in., $\frac{3}{8}$ -in., $\frac{1}{2}$ -in.
- 1—mortise gage.
- 1—10-in., 10-point back saw.

or any work requiring grooves, tongues or "rabbets" (consult your dictionary), you will need a universal plane which is provided with interchangeable blades and suitable

adjustments for doing all kinds of tonguing, grooving, and rabbeting. This plane will have with it a little book of directions that will explain its use quite clearly.

The mortise and tenon joint, Fig. 30, consists of a mortise cut in the side of one member, into which fits a tenon cut on the end of the other member of the joint. We will

speak of these two as the mortise member and the tenon member. Both the mortise and the tenon are usually

centered on the width or the thickness of the stock, the width of the mortise or thickness of the tenon depending usually on the thickness of the tenon member. Stock less than

make a perfect joint as with a shouldered tenon. The tenon should be an easy driving fit for the mortise, the latter being made slightly deeper than the length of the tenon. For most furniture making such as we will undertake, tenons should be made from 1 inch to $1\frac{1}{4}$ inches long.

Fig. 33. Cutting the Shoulder for the Tenon



$\frac{5}{8}$ -inch thick will have $\frac{1}{4}$ -inch tenons, $\frac{5}{8}$ inch to $\frac{7}{8}$ inch will have $\frac{3}{8}$ -inch tenons, and stock above $\frac{7}{8}$ inch will have $\frac{1}{2}$ -inch tenons. This provides for a shoulder on both sides of the tenon, and a still greater shoulder is usually allowed at each end of the tenon. One-quarter inch is a good size for these unless the mortise is very close to the end of its member, as at the top of a table post, when a greater shoulder is allowed to prevent splitting the top of the post.

Occasionally thin stock is mortised in full size—for example, the slats in the end of a table or in the back of a chair—but this is not done where the members must be depended upon for structural strength. Besides, it is not nearly so easy to

After joints are properly fitted, apply a thin coat of thin hot glue all over both members and draw the work firmly together with bar clamps as shown in Fig. 31. Be sure that the work is square and correctly assembled and all joints tight. Leave it twenty-four to thirty-six hours to dry before removing surplus glue and smoothing up. Speaking of hot

Fig. 34. Finishing the Tenon



glue, it is obtained in "flake" form. This flake glue should be soaked twenty-four hours in cold water to

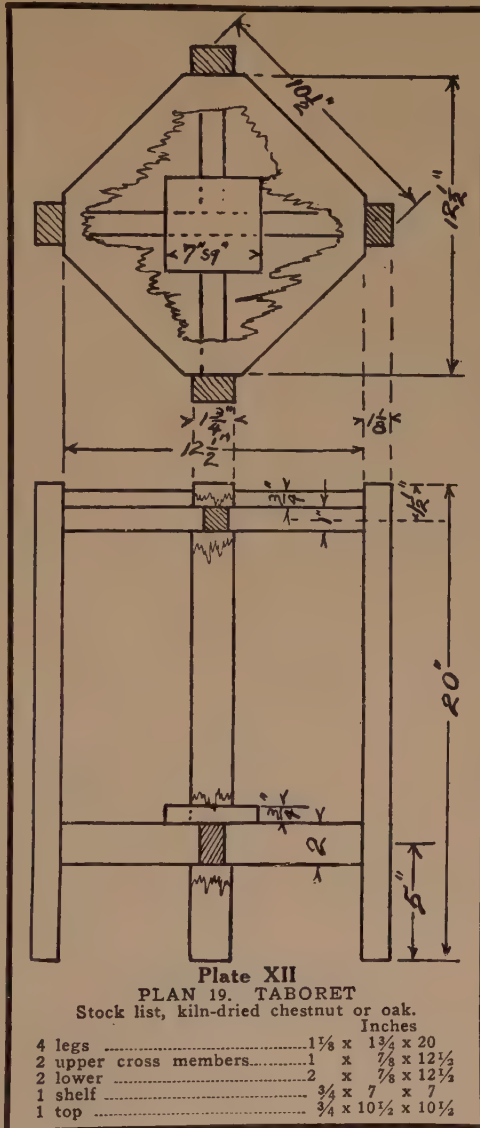
soften it, then it should be cooked in a double boiler (glue pot).

Glue will not hold joints in articles intended for out-of-doors use. Such joints should be pinned, i.e., after they are drawn together, a hole should be bored through both the mortise member and the tenon about $\frac{1}{2}$ inch from the shoulder and a tightly fitting pin or dowel driven in, its ends afterward being trimmed even with the surface of the mortise member. It is not a bad plan to do this with glued joints for it makes them less liable to be broken by sudden blows.

Figs. 32, 33, and 34 will show quite clearly how to proceed in making a mortise and tenon joint. Having determined the thickness of the tenon and the size of its end shoulders, lay out both mortise and tenon carefully, being sure that they correspond in dimensions and that the mortise is properly located.

For the mortise, first square two lines across the face of the stock corresponding in location to the location and width of the tenon member. (See Fig. 30.) In from these, measure for the end shoulders and square two more lines across the face of the mortise member. This latter pair of lines locates the ends of the mortise. Between these, with the mortise gage, lay out the width of the mortise which must correspond to the thickness of the tenon. In setting the mortise gage, first set its two points apart, the thickness of the tenon. This is done by releasing the set screw on the head and turning the thumb screw on the end of the gage. Then set the head to obtain the correct distance from face side of the stock to the mortise.

If the mortise is to be centered, try the gage from both sides of the stock, varying the adjustment of the head until the points register the same



The Fern Stand



from either side.

Having the mortise correctly laid out as described above and shown in Fig. 32, with a bit whose diameter equals the width of the mortise, bore to the desired depth as shown in Fig. 33, cutting away as much wood as possible with the bit. Finish the ends of the mortise, first using the mortise chisel. Using the mallet, drive the chisel in squarely, bevel side toward the mortise, to the full depth of the bit holes and break it over toward the bevel. Finish the mortise sides with a wider paring chisel. Do not "undercut" so as to make the mortise larger at the bottom than at the surface of the stock. Such a joint cannot hold.

For the tenon, first cut the stock to the length called for between the two mortise members plus twice the length desired for the tenon (as-

suming that one is to be cut on both ends of the stock). Measure from the end of stock the length of the tenon and square a line entirely around the stock, drawing the lines with a knife point. Remember in squaring for joints to work carefully from properly marked "face sides." Notice the face marks *x* in Figs. 31 and 32. Having the shoulder line properly established, with a common marking gage set to correspond to the size of the end shoulders, gage for both these

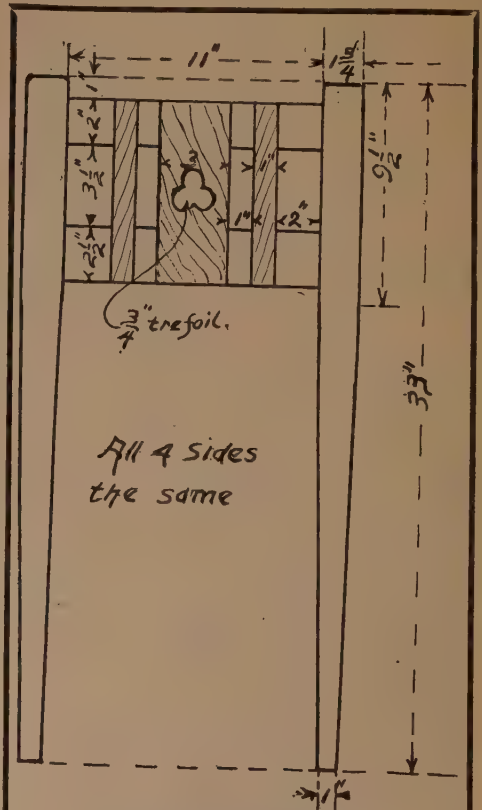


Plate XIII
PLAN 20. FERN STAND.
Stock list, kiln-dried chestnut or oak.

	Inches
4 posts	1 3/4 x 1 3/4 x 33
4 rails	3/4 x 2 x 13
4 rails	3/4 x 2 1/2 x 13
8 slats	3/8 x 1 x 8
4 slats	3/8 x 3 x 8
1 shelf	1/2 x 12 x 12

shoulders. Begin at the shoulder line. Gage from this to the end of the stock, then across the end, and lastly down to the shoulder line on the opposite side. With the mortise gage set with the same distance between the points as was used in laying out the corresponding mortise and with this space centered on the thickness of the tenon member, gage a double line from the shoulder line on one edge of the stock to the end, across the end and to the shoulder line on the opposite edge. Fig. 32 shows the appearance of the tenon laid out ready for cutting, and also the first step in cutting the tenon. Be sure to run the saw *outside* but neatly touching the gage lines.

You will find that you will require considerable practice before being able to make all four cuts perfectly. In Fig. 33 the first cut to the shoulder line has been made and the saw is entering the second. Fig. 34 shows the last cut and Fig. 30, the joint

Fig. 36. Setting the T-Bevel



completed ready to go together. If the shoulder cuts have been rightly made, the shoulders will fit squarely

Fig. 35. Using the Cabinet Scraper



and tightly against the face of the mortise member. If the tenon is a trifle too large for the proper driving fit, pare the sides across the grain with a sharp chisel. Use care, for it requires but a little cutting to make a loose fit and spoil what was a good job.

It might be well to say at this point that all the projects that follow make use of the mortise and tenon joint. You should not undertake their construction until you have mastered the making of this joint and have had considerable experience with all the tool work previously explained. All the work outlined is carefully graded and it is assumed that before any project is undertaken, all the tool work up to that point has been done. With

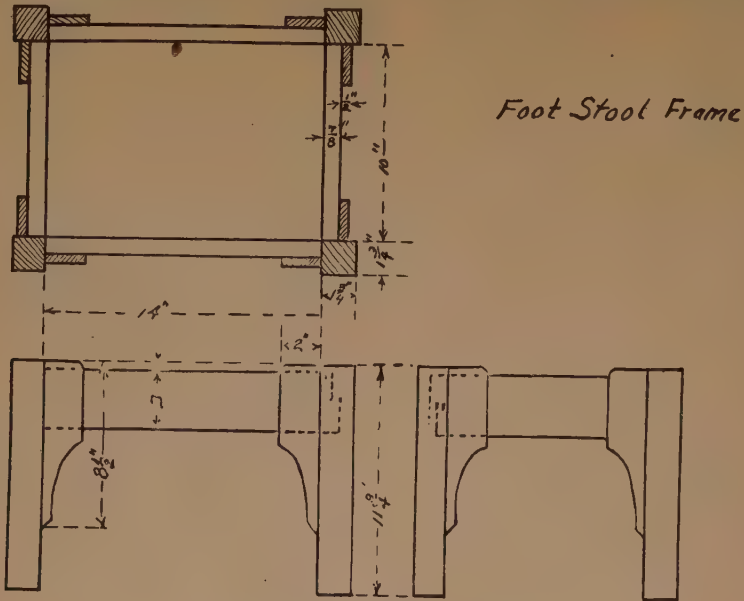


Plate XIV

PLAN 21. FOOTSTOOL FRAME
Stock list, kiln-dried hardwood.

	Inches
4 posts	1 3/4 x 1 3/4 x 11 3/4
2 rails	7/8 x 3 x 16
2 rails	7/8 x 3 x 12
8 brace members	1/2 x 2 x 8 1/2

each new project all the new work is explained. Once directions are given, they are not repeated, e.g., curve cutting is explained in connection with the clothes pole, Plate XI, Plan 18, although curve cutting occurs in many of the projects that follow, nothing further is said about it.

In the plans many details, such as invisible edges and interior construction have

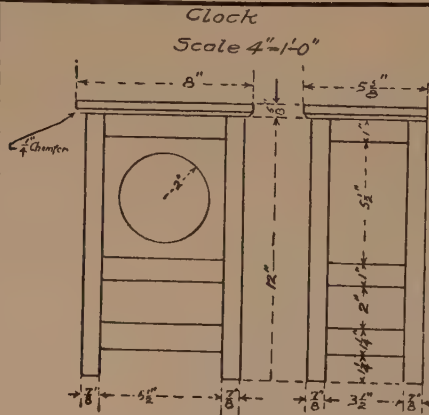


Plate XV

PLAN 22. ALARM CLOCK CASE
Stock list, any suitably seasoned lumber

	Inches
4 posts	7/8 x 7/8 x 12
4 rails	3/8 x 1 x 6 3/4
2 rails (lower)	3/8 x 1 1/4 x 6 3/4
4 upper side rails	3/8 x 1 x 4 3/4
2 lower side rails	3/8 x 1 1/4 x 4 3/4
1 face board	7/4 x 5 1/2 x 7 1/2
2 side boards	7/4 x 3 1/2 x 7 1/2
1 top	3/8 x 5 5/8 x 8

Clock-shelf fitted in assembled frame resting on cleats at correct height to fit clock used.

been omitted for the sake of clearness. The stock list and your own mechanical sense will furnish all the information not conveyed in the plans.

Plate XIII, Plan 20, is a fern stand much like the one in one of the pictures. This affords a good problem for the first mortise and tenon construction. Notice by the stock list that the rails (tenon members) are 3/4-inch

thick, and plan the size of the tenons as suggested in the directions. First, get out the posts to stock size; then lay out and cut the mortises, four in each post or two in each face. The mortises are centered and if cut $1\frac{1}{4}$ -

45-degree miter, otherwise one tenon will be much too short and will not make a strong joint. The slats in the drawing are nailed on; they may be mortised in the edges of the rails. If the latter is done, they must be in

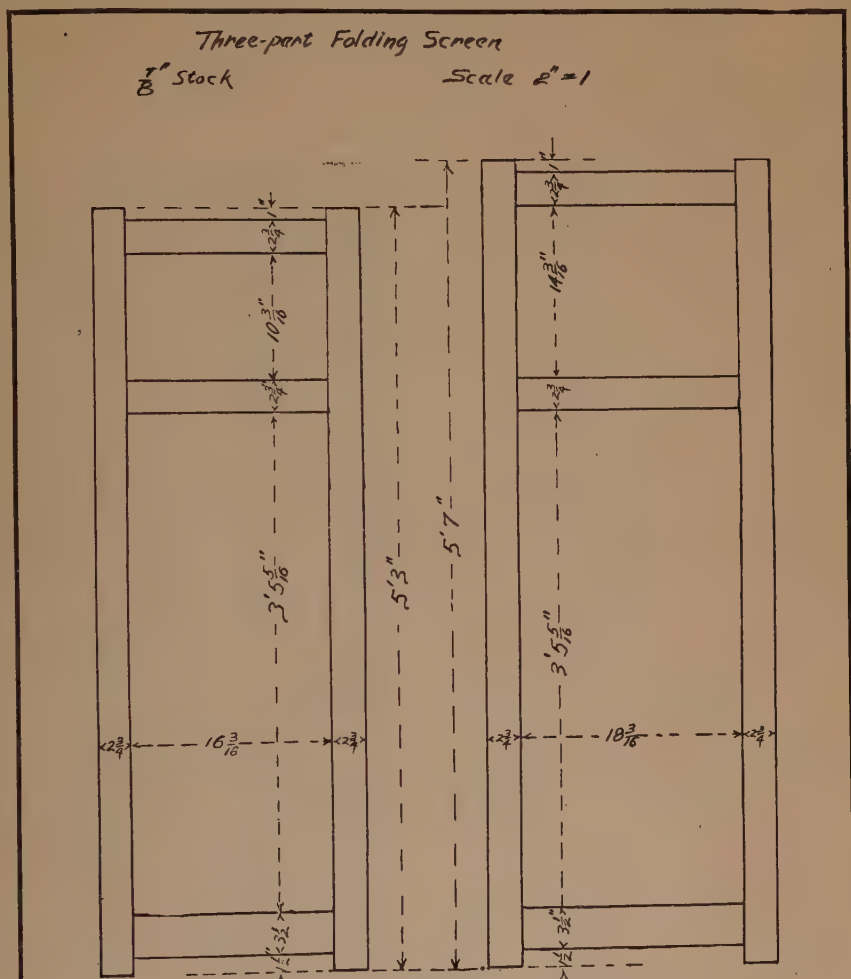


Plate XVI

PLAN 23. THREE-PART FOLDING SCREEN

Stock list, kiln-dried quarter-sawed oak. (For each small section.)

Inches			For the middle section.		
2 stiles	$\frac{7}{8}$ x $2\frac{3}{4}$	x 63	2 stiles	$\frac{7}{8}$ x $2\frac{3}{4}$	x 67
2 rails (upper)	$\frac{7}{8}$ x $2\frac{3}{4}$	x $18\frac{3}{16}$	2 rails (upper)	$\frac{7}{8}$ x $2\frac{3}{4}$	x $20\frac{3}{16}$
1 rail (lower)	$\frac{7}{8}$ x $3\frac{1}{2}$	x $18\frac{3}{16}$	1 rail (lower)	$\frac{7}{8}$ x $3\frac{1}{2}$	x $20\frac{3}{16}$

inch deep, will open directly into each other. In joints like these, the ends of the tenons should be cut to a

place before the rails are glued into the posts. Cut the tapers on the posts and have all parts perfectly

smoothed before gluing up. If you make the piece of hardwood, you will need to use the cabinet scraper

to properly smooth it for finishing, Fig. 35. In assembling, glue it up in sections; first glue two opposite sides, being sure that posts are in proper position to receive the other rails when the first gluing is dry and the assembling is completed. In clamping, place soft wood blocks between the clamps and the work, and be sure that the clamping does not

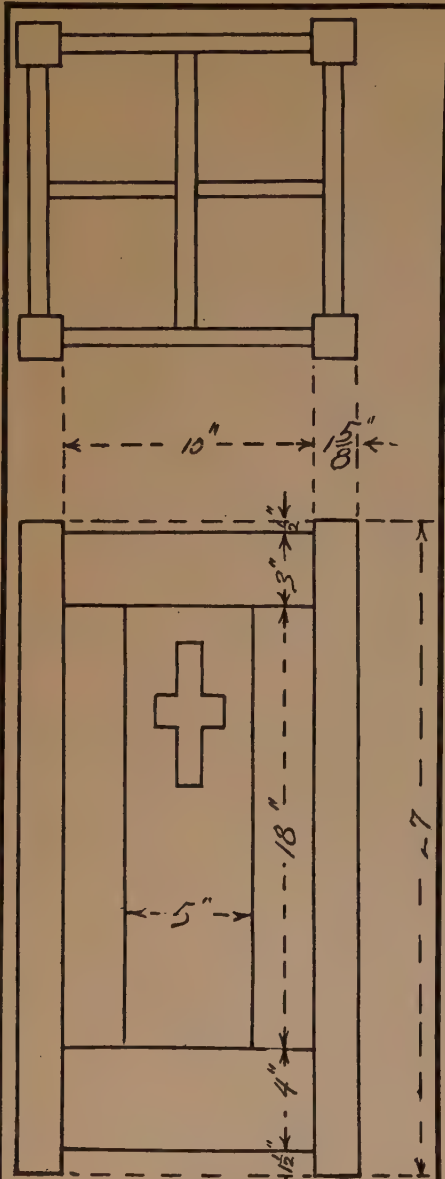


Plate XVII

PLAN 24. UMBRELLA HOLDER

Stock list, kiln-dried stock, oak preferred. See if you can make this stock list yourself.



"roll" the post, leaving an open joint on one side. This may be avoided by shifting the position of the loose blocks so that the clamp bearing is directly in line with the rails. Be sure that work is clamped up "square," drawn together firmly, and that when left to dry it is "out

of wind" (long i in "wind"). The latter may be ascertained by looking across the posts of the section as you would place your eye on a level with

placed on cleats that are fastened with screws to the lower inside surfaces of the lower rails. Cut the corners of this shelf away on a quar-

Hall Clock

Scale $1\frac{1}{2}" = 1'$



Plate XVIII

PLAN 25. HALL CLOCK

Stock list, kiln-dried, quarter-sawn white oak.

	Inches		
4 posts	1 3/4 x 1 3/4 x 71	2 front slats	3/8 x 1 1/2 x 15 1/2
6 rails	3/4 x 2 x 15	1 front slat (wide)	3/8 x 4 x 15 1/2
2 rails (lower)	3/4 x 3 x 15	4 side slats (lower)	3/8 x 3 x 21 1/2
6 side rails	3/4 x 2 x 11	2 side slats (middle)	3/8 x 4 x 26 1/2
2 side rails (lower)	3/4 x 3 x 11	2 side panels	3/8 x 9 x 13 1/2
1 face	3/8 x 13 x 13	2 back slats (lower)	3/8 x 4 x 21 1/2
		2 back slats (middle)	3/8 x 4 x 26 1/2

a wide surface to see if it were warped or twisted.

The drawing does not show the shelf. This may be of soft wood and

ter circle to avoid fitting them to the posts. Plate XIV, Plan 21, is a footstool, the construction of which needs little discussion after the fern

VOCATIONAL TRAINING

Plate Rack
Chestnut

Scale $3'' = 1'$

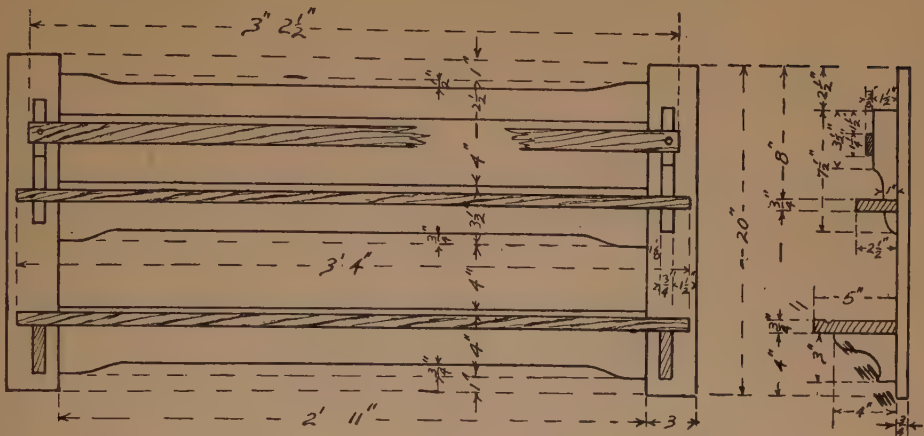


Plate XXI

PLAN 28. PLATE RAIL

Stock list, kiln-dried quarter-sawed white oak

	inches
2 stiles	$\frac{3}{4} \times 3 \times 20$
1 upper rail	$\frac{3}{4} \times 2\frac{1}{2} \times 37$
1 middle rail	$\frac{3}{4} \times 3\frac{1}{2} \times 37$
1 lower rail	$\frac{3}{4} \times 4 \times 37$
2 brackets	$\frac{3}{4} \times 1\frac{1}{2} \times 7\frac{1}{2}$
2 shelf rests	$\frac{3}{4} \times 3 \times 4$
1 plate rail	$\frac{3}{4} \times 1\frac{1}{4} \times 38\frac{1}{2}$
1 shelf (top)	$\frac{3}{4} \times 2\frac{1}{2} \times 40$
1 shelf (bottom)	$\frac{3}{4} \times 5 \times 40$

WALL BOOK SHELF.

Specifications

Material- Solid mahogany throughout. Finish- Mahogany stain, filler and 2 coats Mission-lac; the first cut with 00 sd-paper and the last rubbed to a dull gloss.

Scale 3"=1'

P. S. N. S.
MANUAL TRAINING
DEPARTMENT.
1910

Construction.

Regulation panel work for back, Tens centered, 1" long, $\frac{1}{4}$ " thick with $\frac{1}{4}$ " shoulders, Grooves $\frac{1}{4}$ " deep. Shelves housed $\frac{1}{4}$ " into ends. Shelves and ends fastened to back with 1" F.H.B. screws.

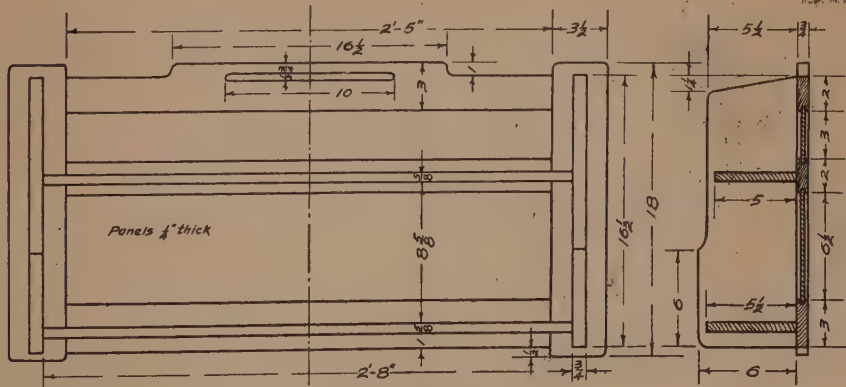


Plate XXII

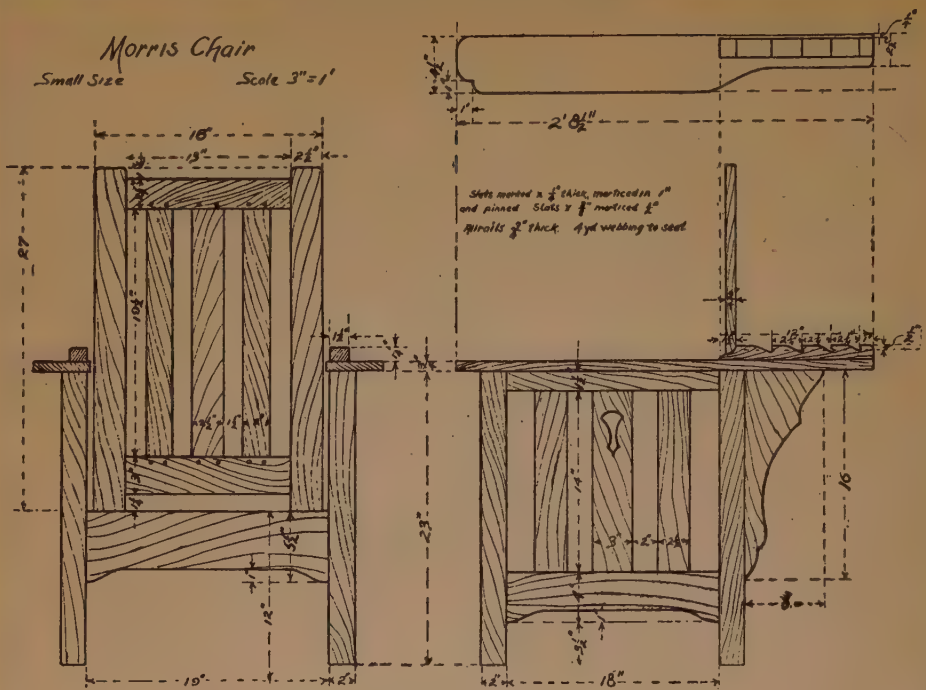


Plate XXIII		
PLAN 30. MORRIS CHAIR		
Stock list, kiln-dried quarter-sawed white oak		Inches
4 posts	2	x 2 x 23
2 rails, back, front	$\frac{3}{4}$ x 4	$5\frac{1}{2}$ x 21
2 rails (upper side)	$\frac{3}{4}$ x 4	$1\frac{1}{2}$ x 20
2 rails (lower side)	$\frac{3}{4}$ x 4	x 21
4 side slats	$\frac{3}{4}$ x 4	$2\frac{1}{2}$ x 15
2 side slats	$\frac{3}{4}$ x 3	x 15
2 brace members	$\frac{3}{4}$ x 6	x 16

2 arms	$\frac{3}{4}$ x $4\frac{1}{2}$ x $32\frac{1}{2}$
2 rod rests	$1\frac{1}{4}$ x $1\frac{1}{2}$ x 12
Back	
2 stiles	$\frac{3}{4}$ x $2\frac{3}{4}$ x 27
1 rail (upper)	$\frac{3}{4}$ x $2\frac{1}{4}$ x 15
1 rail (lower)	$\frac{3}{4}$ x 3 x 15
2 slats	$\frac{3}{4}$ x 2 x 21
1 slat	$\frac{3}{4}$ x $2\frac{1}{4}$ x 21

Cleats and slats under cushion fitted after frame is assembled.

Fig. 37. Using the Block Plane



stand has been built. Note, however, that the rails are flush with the inside or face surfaces of the posts, and note the dotted lines on the side and end views that indicate how the tenons and mortises are arranged. Be careful in cutting the mortises not to split the posts. Glue the braces to the posts, fasten them near the bottom and screw the tops on from the inside of the rails. This stool is intended for a leather or tapestry top. This should be nailed to the top of the rails; then turn the stool over, pack suitable filling

material into the frame, over this lay a board that fits tightly, force it firmly down on the packing, and hole in the beam of the marking gage in the end opposite the spur. Fit a lead pencil into this hole and

Book Shelves

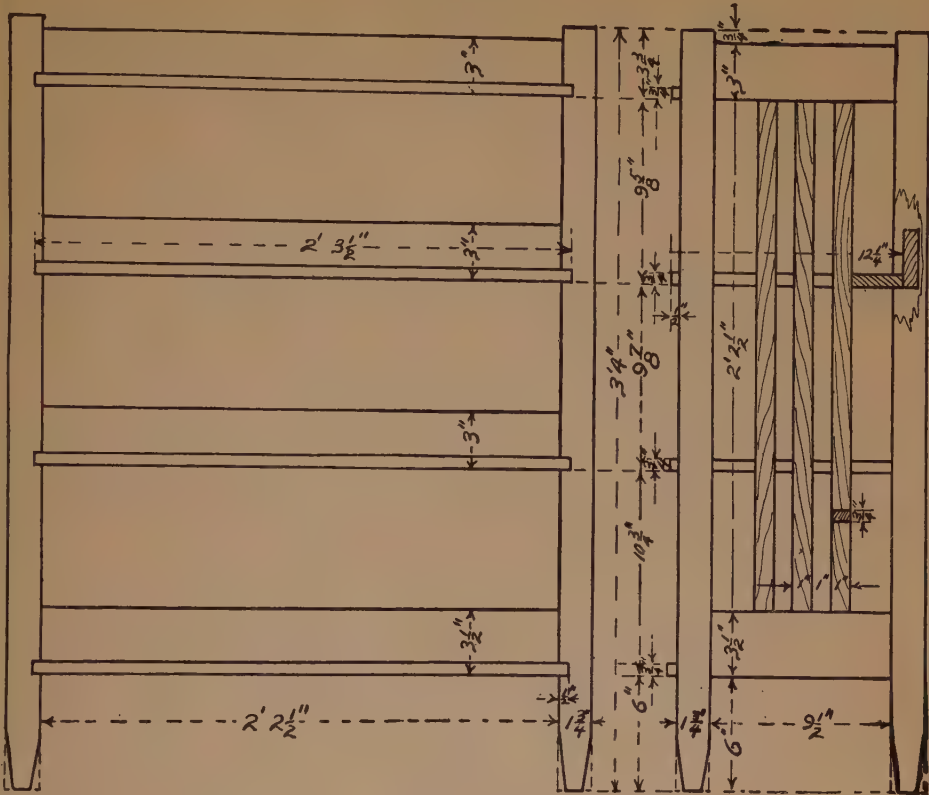


Plate XXIV

PLAN 31. BOOK SHELVES
Stock list, kiln-dried hardwood, oak preferred.

	Inches
4 posts	1 3/4 x 1 3/4 x 40
3 rails (back).....	3/4 x 3 x 28 1/2
1 rail (back bottom).....	3/4 x 3 1/2 x 28 1/2
2 rails (upper side).....	3/4 x 3 x 11 1/2
2 rails (lower side).....	3/4 x 3 1/2 x 11 1/2
6 slats	3/4 x 1 x 27 1/2
4 shelves	3/4 x 12 1/4 x 27 1/2

fasten in place with cleats screwed to the end rails.

Plate XV, Plan 22, involves smaller joints than the preceding projects. The front and side panels are fastened to the inside of the rails, as is also the shelf on which the clock stands. To lay out the chamfer along the top board, bore a

gage as with the spur, first ascertaining the right measurement with the ruler. Cut the chamfer with the block plane with a shearing cut, testing the work with the T-bevel set as in Fig. 36.

The screen frames shown in Plate XVI, Plan 23, involve no new difficulties except those which come

from their size. For these and for all the larger pieces of hardwood furniture to follow it will be advisable to have the stock cut to the required dimensions at some local mill. Make two of the smaller frames and one large one. After they are stained and finished, cover the top panels

Cover the top panels with tapestry, plain denim or burlap of a harmonious color. Then finish along the edges with upholsterer's gimp and fancy nails, evenly spaced. Between the screens, use three fancy surface hinges of brass, placing one set on one side of the screen and the other

Magazine Holder
Scale 2"-1'-0"

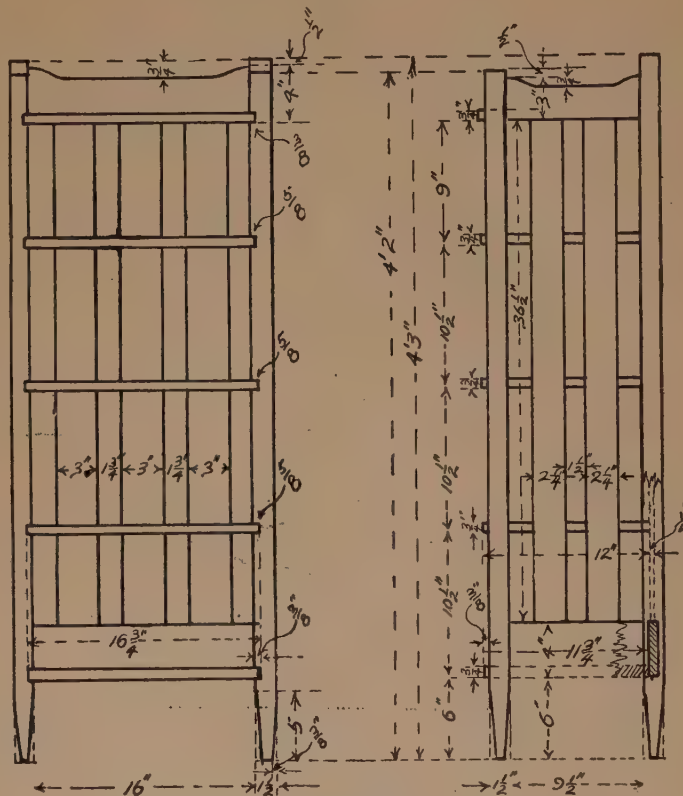


Plate XXV
PLAN 32. MAGAZINE HOLDER.
Stock list, kiln-dried quarter-sawn white oak.

	Inches
2 front posts	1 1/2 x 1 1/2 x 50
2 rear posts	1 1/2 x 1 1/2 x 51
2 rear rails	3/4 x 4 x 18
2 side rails (upper)	3/4 x 3 x 10 1/2
2 side rails (lower)	3/4 x 4 x 10 1/2
4 side slats	3/4 x 2 1/4 x 37 1/2
3 back slats	3/4 x 3 x 37 1/2
2 shelves	3/4 x 11 3/4 x 16 3/4
3 shelves	3/4 x 12 x 17 1/4

with tapestry or with some other suitable material, and remember that both sides will show when finished.

set on the opposite side.

The umbrella stand, Plate XVII, Plan 24, should have a shelf placed

VOCATIONAL TRAINING

in the bottom as described for the fern stand, Plan 20. This shelf should have a round hole cut to re-

half jointed together at their centers, and fitted in, after the remainder of the job is assembled.

Writing Table Scale 2"=1'

Drawer Detail

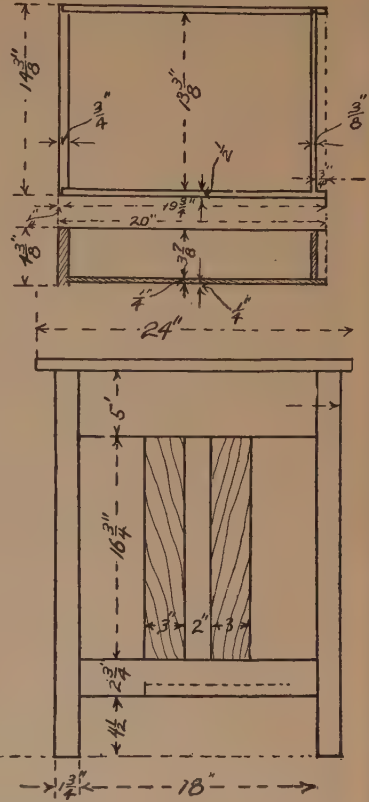
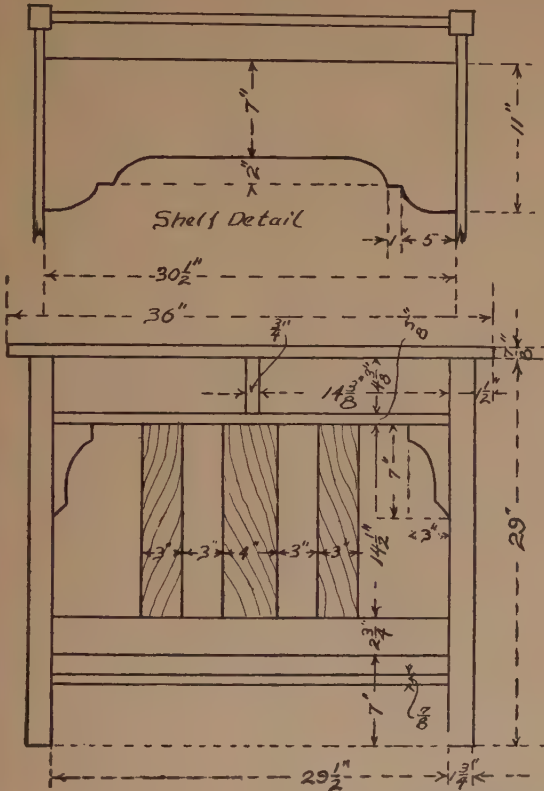


Plate XXVI
PLAN 33. WRITING TABLE.
Stock list, kiln-dried quarter-sawn white oak

	Inches
4 posts	1 3/4 x 1 3/4 x 29
2 top end rails	3/4 x 5 x 20
2 lower end rails	3/4 x 2 3/4 x 20
1 top back rail	3/4 x 5 x 31 1/2
1 lower back rail	3/4 x 2 3/4 x 31 1/2
4 end slats	3/8 x 3 x 17 3/4
2 back slats	3/8 x 3 x 15 1/2
1 back slat (wide)	3/8 x 4 x 15 1/2
1 front rail	3/4 x 1 3/4 x 31 1/2
1 drawer partition	3/8 x 3/4 x 43 3/8
1 shelf	1/8 x 11 x 30 1/2
1 top	1/8 x 24 x 36
For each drawer.	
1 front	3/4 x 4 3/8 x 14 3/8
1 back (soft wood)	3/8 x 3 3/8 x 13 3/8
2 sides (soft wood)	1/2 x 4 3/8 x 19 3/4
1 bottom (soft wood)	1/4 x 19 3/4 x 13 3/8

ceive a deep agate pie plate to catch the drippings of the umbrellas. The cross bars in the top are made long,

The side slats may have a decorative opening cut in them with the coping saw, if desired.

The hall clock, Plate XVIII, Plan 25, is not difficult, but is a long job. Be sure to secure perfectly straight stock for the four corner posts and do accurate work or you will have trouble in assembling. If desired,

The end view of the sewing table, Plate XIX, Plan 26, shows only one pair of legs; the other pair is offset to the right so they will not interfere with each other when folded. The top for this will be made more

Writing Table Cabinet
Scale 3" = 1'

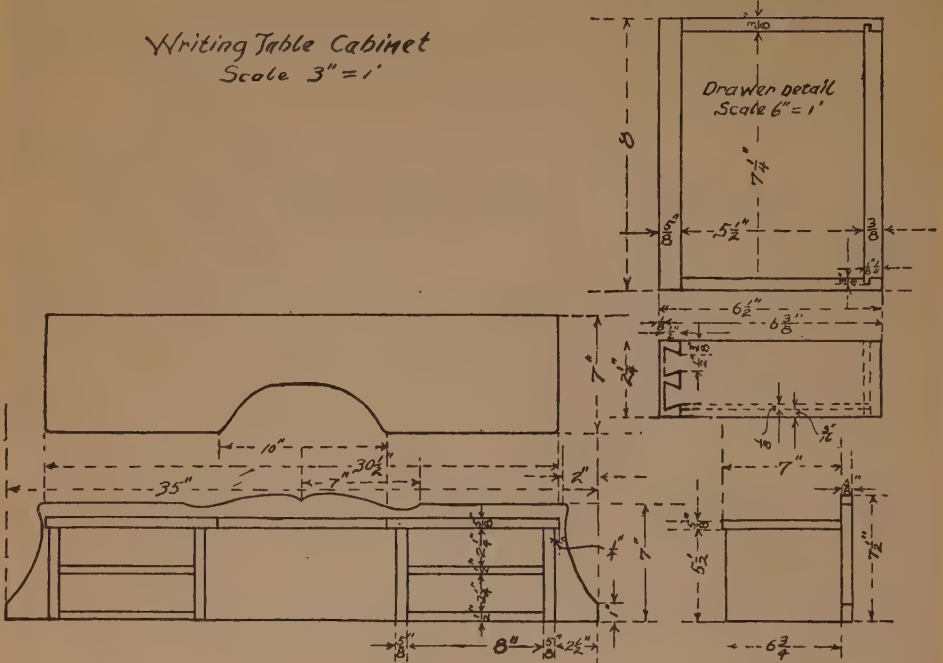


Plate XXVII
PLAN 34. WRITING TABLE CABINET
Stock list, kiln-dried quarter-sawn white oak

	Inches
1 back	5/8 x 7 1/2 x 35
1 top shelf	5/8 x 7 x 30 1/2
4 ends	5/8 x 6 3/4 x 5 3/4
4 shelves	1/2 x 6 3/4 x 8 1/2
Each small drawer.	
1 front	5/8 x 2 1/4 x 8
1 back	5/8 x 2 1/4 x 7 5/8
2 ends	5/8 x 2 1/4 x 6 3/8
1 bottom	1/4 x 5 3/4 x 7 1/2
(Last three items soft wood.)	

the slats may be made to nail on the outside of the rails instead of mortising in, as in the plan. Any reliable local dealer can obtain works for this clock for from \$10 up, and will tell you how to put them in. Make the face of your clock so that it can be removed from the front to provide for inspection of the works from time to time.

attractive if glued up in strips of light and dark wood. Be sure your lumber is well seasoned, otherwise it will not stay glued. Kiln-dried lumber is the best. Have the long joints prepared at the mill. Follow directions for setting dowels, Fig. 25, and make up the top longer and wider than finished dimensions, cutting to size after gluing is dry. To

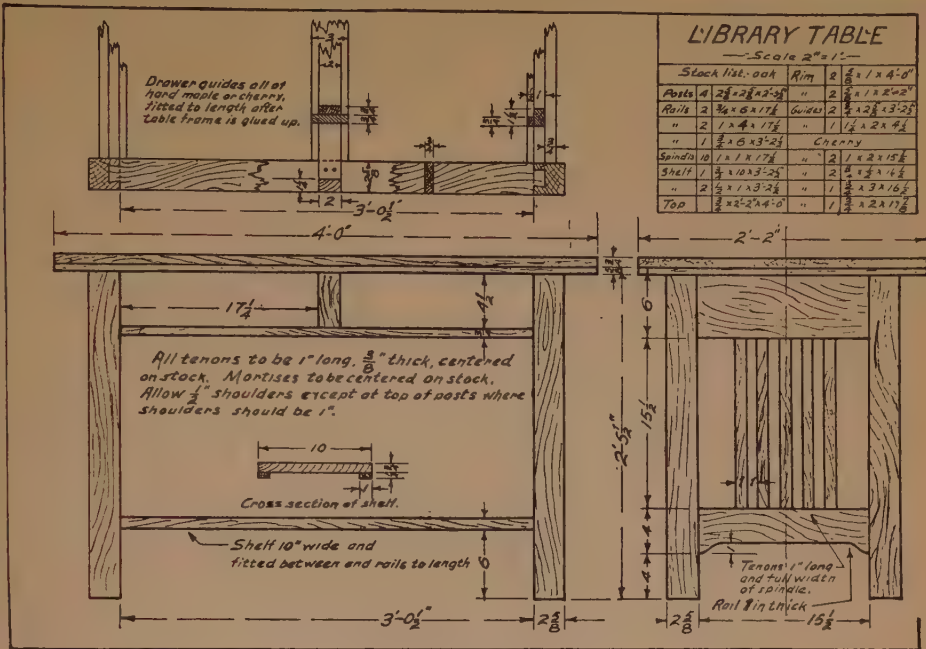


Plate XXVIII
PLAN 35. LIBRARY TABLE

E. L. T.



smooth the ends of the top you will need to use the block plane, Fig. 37. Perfectly made and pinned joints are required between posts and rails. Fasten rails to top with table hinges. The legs are secured open by the spring board, which has two holes

which must be very carefully placed near each end to receive pins in the under side of the rails.

Plate XX, Plan 27, is for a piano bench. This has all the essentials of table construction and makes a good project to do before under-

taking a table. The lower shelf may be mortised through the end rails or fitted between and fastened by first boring a $\frac{3}{4}$ -inch hole from underneath, 1-inch from the end and not more than half-way through the stock. From the inside of this hole, bore with a $\frac{7}{16}$ -inch drill out

fastened to the top of the side rail. Cleats are nailed to the inside of the rails about one-half inch from the lower edge and a thin wood or pulp board fastened to the underside of these cleats. A storage for music is thus provided.

The plate rack, Plate XXI, Plan

Writing Desk
Scale 2" = 1"

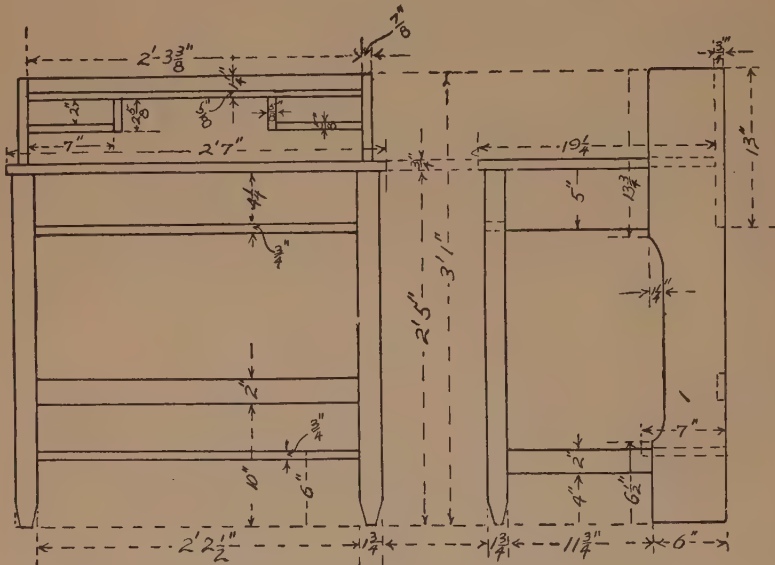


Plate XXIX

PLAN 39. WRITING DESK

Stock list, kiln-dried quarter-sawn white oak

Inches				
2 front posts.....	1 3/4 x	1 3/4 x 29	1 top	3/4 x 19 1/4 x 31
2 rear posts	1 3/8 x	6 x 37	1 shelf (upper)	5/8 x 5 1/4 x 27 1/8
2 upper side rails.....	3/4 x	5 x 13 3/4	2 pigeonhole ends.....	5/8 x 5 1/4 x 27 1/8
2 lower side rails.....	3/4 x	2 x 13 3/4	2 pigeonhole shelves.....	5/8 x 5 1/4 x 7
1 back	3/4 x	13 x 28	Stock for drawers to be worked out from	
1 back rail.....	3/4 x	2 x 28	study of drawer specifications for writing table	
1 shelf (lower).....	3/4 x	7 x 27 3/8	and cabinet, Plans 33 and 34.	
1 front rail.....	3/4 x	1 3/4 x 28 1/2		

through the end of the stock for a screw. Two screws will be needed in each end. Table tops are often fastened down to the frame in this manner. Look over shop-made furniture for hints. The top of this bench is put on with table hinges,

28, is a plain mortise and tenon job that at this point will need no comment, unless it be the general rule that in fastening with screws, e.g. the shelves, place them, as far as possible so their heads will be hidden from view when the piece of

furniture is in its normal position. Such a piece as this should be screwed firmly to the wall with two round-head screws located above the center of gravity.

The wall book shelf, Plate XXII, Plan 29, may be made without the panels, when it is much the same problem as Plate XXI, Plan 28. If made in this manner and the ends fastened to the shelves with screws or dowels, it presents no new problem. It may, however, be made the first piece of panel work as indicated in the drawing. Make the mortises and tenons first. Then with the universal plane set up for cutting a $\frac{1}{4}$ -inch groove, make the grooves, centered on thickness and $\frac{1}{4}$ -inch deep, on lower edge of top rail, both edges of middle rail, upper edge of lower rail, and inner edges of vertical end pieces (stiles). Make the panel a bit less in width than the space plus the grooves to allow for expansion. Glue ends of panels, but not the edges; if edges are fastened and the panel shrinks, it will split. Glue in a piece at top and bottom of groove in stiles.

The best construction would call for a housed joint where the shelves join the ends, i.e., the end of the shelf is "let in" to the end board its full size to the depth of $\frac{1}{4}$ -inch. This is really only a very accurate mortising job, but to do it you will need a bit without a point so the boring can be done without defacing the outside of the end boards. Such bits are called Forstner bits, and $\frac{1}{4}$ -inch, $\frac{3}{8}$ -inch and $\frac{1}{2}$ -inch are the most useful sizes.

The Morris chair, Plate XXIII, Plan 30, presents no new processes. Its dimensions may be changed to suit, those in the drawing being somewhat smaller than standard.

Hinge the back to the back rail and have your local blacksmith make a rod of $\frac{3}{8}$ -inch round iron to support the back. Loose cushions are usually used in Morris chairs and slats should be provided, resting on cleats near the bottom of the front and rear rails, on which to place the seat cushion.

There is really no new work in the bookshelves or in the magazine holder, Plate XXIV, Plan 31, and Plate XXV, Plan 32, but great accuracy must be exercised both in measurements and in working. Cut the notches in the posts all to the same depth and be sure the ends of the shelves are perfectly square and all to the exact length required. End sections are glued up first, and all shelves and the members of the back sections must go in together. Slats may be nailed with finishing nails to the shelves.

Notice in Plates XXVII and XXVIII, Plans 33, 34, and 35, that the front rail under the drawers lies horizontally so that the mortises in the posts will be crosswise instead of lengthwise. Study Plan 34 for the arrangement of drawer guides. Plan 33 will show the best method of drawer construction. The ends of the front board have a rabbet into which the end of the side board is glued and nailed. A groove, run $\frac{1}{4}$ -inch from the bottom of front and side boards, receives the bottom which is glued into the front board only. The back board fits in grooves near the back end of the side boards and rests on top of the bottom board. The bottom, if made of wood, will, of course, need to be glued up out of several pieces. It would be well to make it of $\frac{3}{8}$ -inch stock and thin the front and ends to fit the grooves. It is glued at the

front only and placed under the back board to allow for the variation in size that is inevitable with such wide stock. Where dimensions are not given, make the drawers to fit the space provided for them.

Fasten in bottom shelves and fasten down table tops as explained for the end of the brace bar on the piano bench, Plate XX, Plan 27.

Table tops should be squared to size, the underside planed to a flat surface, and then fastened to the frame. Plane, scrape and sandpaper the top after it is fastened down. In planing such wide and cross-grained surfaces, use a sharp smooth plane and go crosswise with a shearing cut. Oil the ends of the top to prevent the joints from opening and finish both sides of the top to prevent shrinking and swelling by shutting the air from the wood. Do not glue up a table top very long before the frame is ready to receive it, and finish it as soon as possible after you have it smoothed.

Plate XXVI, Plan 34, shows, in the detail for the small drawer, a dovetail joint. This is not essential but should you care to do it cut the tails first. You will find the T-bevel the tool to lay them out with. Bore a hole between them and use the

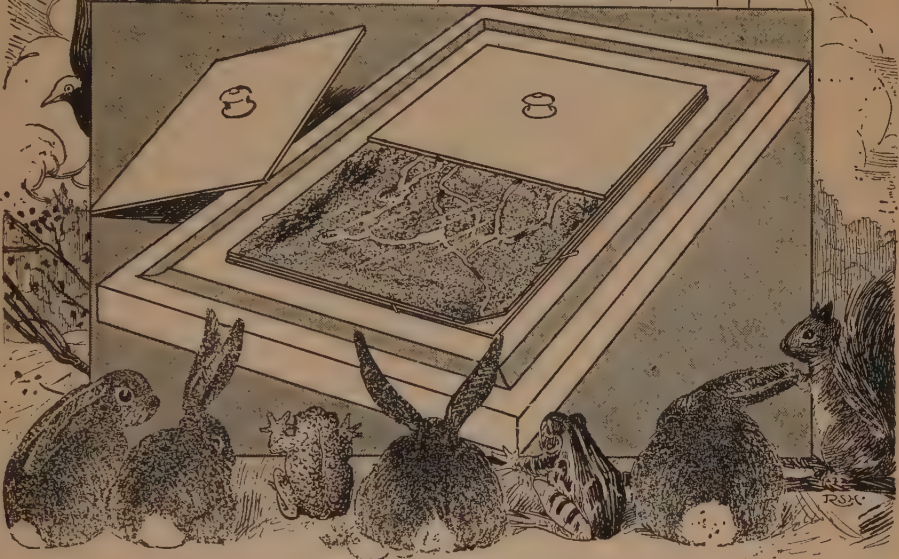
back saw and chisel to finish the cutting. Mark the mortises in the ends of the drawer fronts from the tails, bore them with the Forstner bits. To get into the sharp corners you will need a chisel ground to "skew" point. A good dovetail joint is considered the test of an excellent workman.

Probably the best manner of fastening the cabinet together is by housed joints where the shelves go into the ends and the ends go into the top shelf, the back to be fastened on with screws and the whole screwed to the table from the under side of the top.

Now, my young friend, I bid you study carefully and build honestly. My mother often said to me when I was a lad, "First be sure you're right, son, then go ahead." I commend her advice to you. It is good in building these wooden things we have been talking about; it is even better in building that glorious thing called manhood. And if these pages of directions have led you to build well and joyously and to rejoice in the rewards of common toil, you will have built not only good and useful pieces of furniture but a substantial and beautiful part of that structure that men call character.

LESSONS AT HOME AND AT SCHOOL

PETS



Furnished Apartments for Ants

ANTS are such little folks and have such interesting ways of building homes that we must make for them a special apartment to keep them alive and comfortable. To make an ant apartment, take a piece of plank $1\frac{1}{4}$ inches thick, 20 inches long and about 16 inches wide, and near the edge dig a furrow $\frac{1}{2}$

*The Ant
Castle and
its Moat*

inch deep. The plank should be painted, furrow and all, to keep it from checking. This plank is the yard around the apartment and the furrow is to be filled with water, making a moat to keep the ants in their little castle. For the apartment itself we must have a sheet of tin 11 inches square, made into a tray by turning up the edges all around, about

$\frac{3}{8}$ inch. Place this tray in the middle of the plank and place on the bottom of the tray a pane of window glass 10 inches square to make the floor of the apartment. Place around the edges a few burnt matches to hold the ceiling up from the floor, and cover the glass with a thin layer of fine soil, and at one corner place a triangular piece of blotting paper about 4 inches long. Place over this, resting on the matches, another sheet of glass, 10 inches square, for the ceiling. But this ceiling must have one corner cut off so as to make a triangular door for the ants to enter. This door should be placed so that one corner of the blotting paper may be reached through it. After the ceiling is put on we must make the roof, which consists of two pieces of thin boards, each 5 by 10 inches in size, and each with a knob or a screw-eye at its center to lift it by. For we have to take off part of the roof each time we wish to see what the ants are doing.

In order to get some ants to live in the apartment, we must take a 2-quart mason jar and a trowel and go to some field and turn over stones until we find under one a colony of ants with plenty of young ones. These look like little white grubs or wheat kernels. With the trowel, lift the soil, ants, youngsters and all and carefully place them in the jar and screw the cover on, thus being sure that our captives do not escape until we get them home and empty the

contents of the jar on the roof of the nest. The ants will soon find their way into the little apartment, and will carry their babies in there and hide them in the dark. This will happen in two or three hours, and then the dirt may be removed from the roof covers and the ants will be settled in their apartment.

We must remember that light disturbs the ants very much, so we must lift off only one cover at a time when observing; and we must not keep this off very long. Fresh food must be put on the plank each day, such as bits of hard boiled eggs, finely minced, lean, raw meat, any dead insect, or spider, bits of bread, broken berries and fruit, seeds of plants and

grasses. The corner of the blotting paper should be wet with water from a pipette every second day, for thus the nest is kept properly moist. The moat must constantly be filled with water, or the ants will escape. In such a nest the ants may be seen making their toilets, feeding and caring for their young, talking by patting each other with their antennae and many other interesting things. They will always choose some corner into which they will dump the waste matter of the nest.

While it is desirable to have a queen mother in such a nest, yet a queen is so hard to find that we must usually be content with ant workers and their young. The ants will be very contented while they bring up their young.

Moss Gardens for Toads and Tree Frogs

Take an aquarium jar and place about three inches of gravel on the bottom, building up one side much higher than the other. Cover the

higher side with moss, if you have it, or plant some ferns in it, or leave it bare. Pour in enough water, carefully, so that it will cover the lower

A Cousin of the Toad



Bull-Frogs make known their presence in every pond and quiet lake by their deep-voiced bass chorus, but how many of us ever saw one of these interesting animals at close range? This you can do if you keep them for pets.

part of the gravel, but will allow the higher part with the moss to project above, so as to make land for the toad to live on. There should be as much land as water in this little toad garden. This is necessary, for the only way a toad can drink is by getting into the water and letting it soak into its skin. There should be a cover of wire netting, fitting firmly upon the jar, so Mr. Toad cannot hop out. The moss garden must never be placed in the direct sunlight; and if it becomes smelly, the gravel should be washed or renewed and the garden made over.

The toad should be fed twice a week. Flies caught in a wire trap

and held in water for a moment may be emptied into the garden, so that the toad can take his breakfast food in his own way, which is a very interesting way. Mr. Toad's fork is his tongue, and instead of having tines, it is sticky, like tangle-foot fly paper. It is fastened to the front of his mouth, so that he can dart it out and stick it fast to a fly and pull it back "quicker than a wink." The toad also likes meal worms and earth worms, and with a little patience he can be taught to take bits of liver from the point of the forceps.

You can see many interesting things about your toad in a moss garden. Its warty back looks just like the soil in the garden where the



The "froggie who under a toadstool sat", conventionalized, makes a fine black-board border for the school room. This is how it is used by New York State teachers in connection with the State Department of Visual Instruction.

toad loves to hide. Its eyes are beautiful, and it has tiny nostrils and a circular, flat ear just behind each eye. Its throat beats to help it breathe. Its strong jumping hind legs have feet with five toes, which are partially webbed. Its short arms have hands with four fingers. It is fun to see the toad bury itself in the ground or swim in the water; and, most of all, it is fun to see it swell up with enjoyment when you scratch its back with a straw.

*His Throat
Beats to Help
Him Breathe*

How to Care for Tree-Frogs

The moss garden is just the place in which to keep a dear little tree-frog. Only we should add to it a bit of a branch covered with bark for the tree-frog to perch upon.

How to Keep a Squirrel "Squirrelesome"

Squirrels are such active creatures that it is wicked to keep one cooped up in a small cage, even though there is a wheel in which it can play. If possible squirrels should be given their freedom out of doors; they will become very tame by regular feeding, and thus make charming pets. If this is not possible, a big cage, at least six feet square is necessary; it should be made of chicken wire $\frac{1}{2}$ inch mesh. Near the top, at one side, should be fastened a nest box about one foot square with an opening 3 inches wide near the top. Dry leaves and grasses are to be

This froglet is the most fascinating of all frogs to keep as a pet and to watch. It is a tiny creature, with beautiful eyes and knowing ways. It has a little round disc on each toe, which is covered with a sticky substance that helps it to hold on to the bark of trees, where it naturally lives. It is a wonderful musician; its little throat will swell out until it looks as large as a marble, when it is making its sweet but stirring song.

*Mr. T. Frog
and His
Funny Feet*

The tree-frog, like the toad, finds a cage full of half drowned flies most diverting hunting. It also is partial to meal worms. Bits of liver at the tip of forceps, if held enticingly in front of a tree-froggie's nose, suddenly disappear.

used to make a bed in this box. Branches should be placed in the cage so as to give the squirrel a chance to leap and play. A wheel may also be added for the little captive's amusement. It may be coaxied into the wheel by placing in there a few nuts. A squirrel may also be kept comfortably in a room, but care must be taken lest it gnaw its way out. A nest box is as necessary in a room as in a cage.

Squirrels should be fed plenty of hard shelled nuts, like walnuts, hickory nuts and butternuts, so that their

*Make a Home
Not a
Treadmill*

The Saucy Little Gray Squirrel



Squirrels are such active creatures that it is wicked to keep one cooped up in a small cage. If possible, they should be given their freedom out of doors; they will become very tame by regular feeding and thus make charming pets.

teeth may be kept from growing too rapidly. They are fond of chest-nuts, acorns and will even eat peanuts. They are also fond of berries, lettuce, corn, bread and milk, bread crusts, and many kinds of breakfast

*The Food
Squirrels
Like Best*

foods. Lumps of hard plaster must be kept where the squirrels can have access to them; and every day there must be fresh water supplied in a dish which it is impossible to tip over. A baby squirrel may be fed luke-warm milk from a spoon.

How to Make Bunny Comfortable

Bunny's house must be made so that it will keep him warm and dry, and at the same time, just like little boys and girls, he must have plenty of fresh air. Bunny's house is called a hutch, and in size it should be at least a yard long, 18 inches wide and 18 inches high. The roof must not let in a drop of rain or of melting snow. One end should be very tight, so that there can be no drafts; in the other end, there should be a door. At the end farthest from the door, a little bed chamber should be partitioned off. The floor of the hutch should not rest upon the ground, and it should be carpeted with a layer of sawdust and above this a layer

*Building the
Hutch for
the Rabbits*

of clean straw or hay. The sawdust in the outside room will need to be replaced daily with a new supply. Bunny is very careful of his bedroom, so the bedding there need not be changed so often. The hutch should be placed in a yard fenced with chicken wire, which must be set into the ground to the depth of a foot; otherwise Bunny will burrow out. If the yard is small it may be roofed over; and, if several bunnies are kept together in such a yard, each should have a little house of its own. A yard to run about in is almost necessary for Bunny's health, since he needs to take exercise.

There are so many things which Bunny likes to eat that we can al-

Pet Bunny and a Baby Chick



This nice, white bunny had his picture taken. I wonder if you could guess from the picture what day it was when he had it taken. Bunnies are such dear pets, they are so soft and warm and have such queer, long ears and such squirmy, pink noses.

ways set his table to suit his taste. He likes cabbage leaves, sliced beets, parsnips and carrots. If he can have all of the sliced carrots he can eat he will always be well. He likes fresh grass, dandelion leaves, lettuce and parsley. He also needs dry food, and is fond of good clover hay; this should be used for his bedding so that he can eat up his bedspread at his leisure. He also likes oats, bran and meal, which should be dampened enough to be crumbly.

Bunny's table should be a pan with its edges turned in so that he cannot pull his food out. His pan should be washed and scalded two or three times a week. He must also have fresh water every day in a drinking pan fastened to the side of his hutch, so that he can drink without spilling the water. The drinking pan must be cleaned often.

If Bunny is troubled with di-

arrhea, give him dry food instead of green food. If he takes cold and looks as if he needed to use a handkerchief, his nose should be bathed in warm water once or twice a day so that the mucus will not dry and stop his breath, and he should be given a warm bath and some hot milk. If we need to move Bunny we must never lift him by the ears as if they were his handles. We may take him by the ears with one hand but always bear his weight from below with the other hand.

Mama Bunny should be given a home of her own apart from the others, when a litter is expected. She will make a comfortable bed for her bunnies out of hay, and will line it with soft hair which she will pull from her own breast. After the baby bunnies come, she should not be disturbed for a few days or she will lose her mind and destroy them.

When she leaves her nest to go out for food, we can take a peep at her little family. Baby Bunny is born blind, and scantily dressed in silky fur. After nine days its eyes open and by the time it is a month old it will hop about "lippety, lippety," and then may be fed bread and milk, which Mama Bunny will also

enjoy. Later, fine bran mixed with carrots, or dampened oatmeal will be relished by the little bunnies. They should be taken away from their mother when they are two months old, and all of the little girl bunnies should be put in one pen and the little boy bunnies in another pen, quite separate.

Gold Fish and the Aquarium

Go to the nearest pond or quiet stream where water plants grow, and in a pail of water bring home several of these plants which live their whole lives below the water surface. Place in the bottom of the glass aquarium a layer of sand and gravel an inch or two deep, and then carefully set in this sand the water plants and anchor their roots by placing little stones on them. After this is done, add water by pouring it from a pitcher very gently down one side of the aquarium so as not to uproot or disturb the water garden. In such an aquarium the water is kept pure by the growth of the plants, so it will not need to be changed more than once a year, when the aquarium will need a thorough cleaning. Fish or other water creatures may be kept comfortably in this aquarium, which should never be

placed in the direct sunlight, but as near to a north window as possible. A dip tube should be used to remove waste material from the bottom.

Gold fish may be kept very comfortably in such an aquarium. They may also be kept in an aquarium where there are no growing plants. If a fish globe is used, it should never be more than half full of water, so that there will be as much water as possible in touch with the air. If the globe is filled to the brim, the poor fish will suffocate. The gold fish aquarium should never be placed in the direct sunlight; the water in it should be changed at least twice a week and great care must be taken to have the fresh water of the same temperature as that which is emptied out. If rice water is fed to the fish, the water must be changed three times a week. When changing the

A Bluebird House



This little boy and his sister had a garden, but the worms and bugs ate the young plants in it most greedily. So they decided to build a bird house as an invitation to the bluebirds to come and eat up the bugs. Here you see them putting up the house in a corner of the garden.

water, take the fish out carefully by hand or with a little dip net, and place them in a basin of fresh water while the globe is being cleaned.

The most common cause of death of gold fish is over-feeding, for they require a very small amount of food. Two kinds of food should be given, ground fish or other animal food, and rice water, oatmeal, or flaked vermicelli. Bread or anything with yeast in it should never be given. Gold fish should be fed every day at a regular hour and only a small pinch of food for each fish should be given. Pond snails, newts and turtles should never be kept in an aquarium with gold fish.

How to Raise Pigeons

These lovable birds must be kept in a house which is rat and mice proof. If they are kept in a

dove cote, a guard of zinc should be bent down around the base of the standard which supports it, so the

rats cannot climb up. If the pigeons are kept in a house such as is used for poultry, it should have an inter-

lining of wire netting. The nest boxes should be about a foot square with a threshold outside of each for one parent to perch upon while the other is sitting on the eggs.

The whole pigeon house should be occasionally whitewashed, outside and in, with lime.

Pigeons should be fed twice a day. They are fond of red wheat, Canada peas, buckwheat, hulled oats, kaffir corn and millet; as a treat once in a while, the seed of rape or hemp

may be given. Barley, rye and large kernelled corn should never be offered. To keep the pigeons well, they should have green food, such as lettuce, onion tops, etc. They

also need salt; a large lump of rock salt, moistened, may be placed where they can get at it any time or salt

Feeding "Old Bobbie"



"Old Bobbie" was a robin that came to this same window sill four years in succession. Two small friends of his are offering him breakfast, as you see.

An Interesting Pet



This bird looks as though he were angry, but he is not. He is a ruffed grouse—a kind of partridge—and his feathers just grow this way. The father of the little girl in the picture raised him from the egg. He is quite tame.

codfish may be tacked to the wall where they can nibble it. Gravel is quite necessary to the pigeons' digestion, but if they are free to fly they will get it themselves. If they are confined in a yard of chicken wire, they should be given crushed oyster shells mixed with sand and charcoal. They must also be able to get a drink of fresh water whenever they desire. If they cannot be given access to running water, fresh water should be placed twice a day in shallow pans in their yard. A pigeon does not act when drinking like any other

bird. Did you ever notice this difference?

Seventeen days after mother pigeon lays her eggs they hatch into very awkward looking little squabs.

How the Mother Feeds Her Babies But the parents think they are the most beautiful babies in the world and feed them with a food which is produced in their own stomachs. After five days the parents give them grain which they first soften in their stomachs. A squab is fed on pre-digested food in this way until it is five weeks old.

How to Care for a Canary

Andy is a Hartz Mountain singer with red bracelets on his legs as a tag for his pedigree. He has a wonderful song which he learned from a flute and when he sings, he lifts up his head so as to give his lungs room and his notes bubble out of his throat.

As soon as the cover is taken off his cage in the morning, he stretches, then hops down to get some breakfast from his seed dish. After that *What Andy Does All Day* he begins calling for his bath. He is very fond of his bath tub. For, like all imported birds, he will use only an outside bath, which is a zinc bottomed box with three sides and sloping top of glass. The open side is hooked on to cover the open door of his cage, thus giving him a little glass "bay-window" for a bathroom; and although he may splash around in the water a great deal he does not wet his perches or the bottom of his cage. After his bath, Andy is let out of his cage for an hour or two in a room with screened windows; he loves to fly around and explore everything he can reach. If his master or mistress enters the room he at

once begins to beg for hemp seeds which are kept in a basket on the bureau; he loves hemp seeds so much that he will come and take them from the fingers, and can be coaxed to do almost anything by giving them to him as reward. However, he is allowed only a few hemp seeds a day.

When it is time for him to return to his cage, fresh water is put in his drinking cup and fresh seeds in the seed dishes. He watches attentively while this is being done and at once goes into his cage to feast. Fresh lettuce leaves are placed in a glass *What Andy Has to Eat* of water which in turn is placed in the bathtub which has been emptied and again hung over the door of the cage. This is a way to keep the lettuce fresh for hours. Fresh leaves of lettuce, chickweed, cabbage or slices of apple are quite necessary to the health of a canary. Andy's seeds are a mixture for "roller canaries," which means that plenty of the seed of summer rape, which is brown and not black like mustard seed, is mixed with canary seed and millet. If Andy were an English or American

Queer Companions



Here are a rose-breasted grosbeak and a young toad, both pets of the little girl who is holding them.

canary, he would be given less of rape seed. He is given a teaspoonful of seed each day and all his dishes are emptied and cleaned often. Occasionally he is given a bit of dry cracker for a relish; and he always has sand on the bottom of his cage and a cuttlefish bone is wedged into the wires at the top, so that he may eat of either and keep his digestion in good order.

Andy's perches are not all of the same size. Three of them are $\frac{1}{2}$ inch in thickness and taper toward the ends; two are not more than $\frac{3}{8}$ inch thick and thus his feet are never tired. His cage is 10x14 inches. A

Three Little Homeless Babies



The nest in which these little chebecks were hatched and reared was blown down. The little girl picked them up from the ground because she was afraid a cat or dog would kill them. A few days later, when their wings were stronger, she put them back in the tree and they were able to keep out of danger.

canary cannot be kept comfortable in a cage smaller than this. The cage and its perches are cleaned at least three times a week, and often-er if necessary. The perches are dampened, cleaned and thoroughly dried before they are put back. Damp perches would give Andy rheumatism. Andy loves to have his cage near the window where he can see what is going on out of doors, but it is never hung directly in the window. It is either suspended from a hook or placed on a stand so that it may be far enough from the window so he will not be in a draft which might give him a

Two Bird Invalids



In the basket, being fed, is a fox squirrel that bumped his head on a wire and was hurt so that he was not able to take care of himself for a few days. A cedar bird is perched on the little boy's hand. He has already had his dinner. A cat attacked him but he managed to escape from her, though his wing was badly hurt. Dolls take second place where pets are concerned, you see.

Some Bluebird Orphans



The bluebirds, that came to live in the bird house in the garden, deserted their four children during a long, cold rain storm. The hungry little ones would surely have starved if they had not been cared for by the children. After being fed until they were grown up, they were quite tame and often came to the children to be fed and petted.

Champion Bird House Builders!



© *Wide World*

You can make a bird house like the one James is holding so proudly, by hollowing out a short log, and roofing it with a piece of bark. You can make the tiny porch of twigs, and fasten the floor to the side walls by a leather hinge. A piece of wire will make a good hook.

Mabel's bird house looks like a basket, doesn't it? She followed the instructions found on page 750, and you can easily do the same, as they are simple.

cold and spoil his voice. His cage is never placed in the direct sunshine except for a few minutes after he has bathed, when he loves to fluff his feathers and take a sun bath.

Andy is usually let out of his cage for two hours again in the afternoon. As soon as it is dark he retires to his swing and his cage is covered with an envelope of thick wrapping paper which fits closely around the bottom of the cage, but is open on the top.

Last summer, Andy was a very dumpy, silent bird, for he was shedding his feathers; this is as hard for a bird to endure as is measles for a child. During this period he was given, in addition to his other food, the yolk of a hard-boiled egg

chopped finely with an equal amount of cracker crumbs and a liberal sprinkling of cayenne pepper.

Pretty soon a mother bird will come to live in the cage with Andy, and they will first have some pretty eggs and then some baby birds. The nest will consist of a tin strainer about $3\frac{1}{2}$ inches wide lined with cotton and covered with cheesecloth, which will be sewed smoothly around the edge of the nest. Both birds will be fed on hard-boiled eggs mixed with stale bread, in addition to their seeds and green food. Fourteen days after they are laid, the eggs will hatch and Andy will think those little bare, scrawny, blind birdlings are the most beautiful creatures in the world.

LESSONS AT HOME AND AT SCHOOL STORIES FOR CHILDREN

Please Tell It Again

The Art of the Story Teller



DO YOU remember teasing for stories when you were a boy or girl? You can well believe that you must have done so when you think how many nonsense rhymes, fables, fairy tales and hero stories you know. And perhaps you now have a little man or maid in your house, a room full of eager children in school, or a stream of them coming to you in a library, to remind you of this universal demand of childhood. But that children need stories for their full mental and moral development is a recent discovery of Child Study.

As to what stories they need, it was the children themselves who directed the attention to old favorites. There are classics of which the little folks never tire. "Tell it again" they say of the *Little Miss Hood* and *Other Friends* Mother Goose rhymes, of Aesop's Fables, of such rhythmic narratives as *The Three Bears*, and of such fairy tales as *Sleeping Beauty* and *Red Riding Hood*. These stories are loved because they really are the best that the world has ever had to offer, the slowly gathered and precious culture of ancient peoples of East and West.

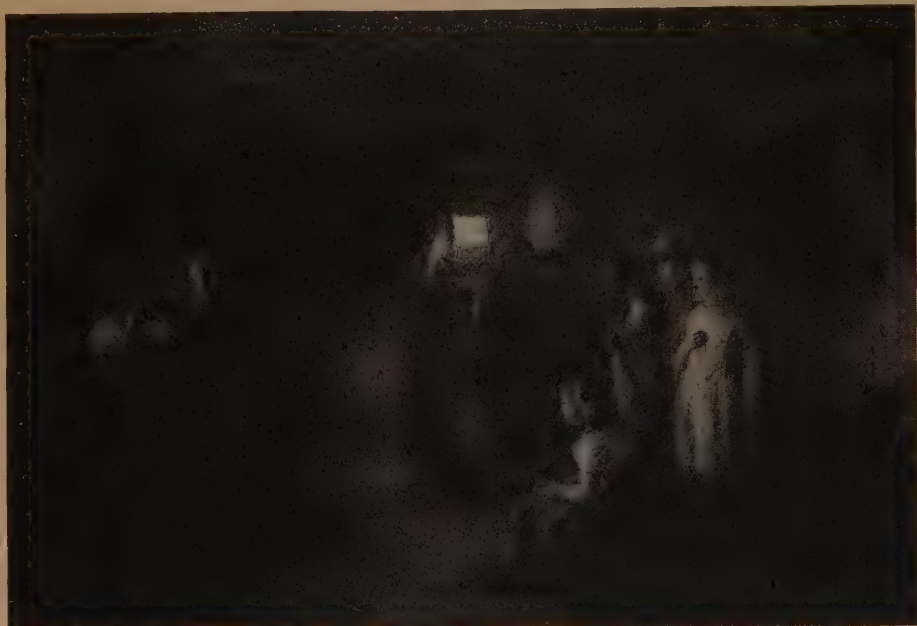
Legends, Epics of History for Older Children

Nor did we think that, beyond this folk lore, there was a vast body of legend, epic tale and history, story of even greater cultural value, that was actually being withheld, to the infinite loss of the older children

high school age—and nine-tenths of the children never go to high school—were they brought back into a contact with the world's great literature. By that time their taste was perverted.

The Great Story Telling Movement

In recent years experiments have



"The Legend"

Painted by George Paul Chalmers of the Royal Scottish Academy

Here is a group of Scotch children listening to an old Scotch woman telling one of the numerous legends in which the history of Scotland abounds. Did you know that from such native storytellers the boy who afterward became Sir Walter Scott, one of the most famous storytellers of all time, learned many of the tales and legends recorded in his delightful works?

who were supposed to have outgrown their love for stories. When the child went to school he had a dull uninspired reader by anonymous writers, as if to read were an end in itself and not a means, and all his other text books dealt with figures, names and dates—colorless facts. Craving life, adventure, romance, the adolescent boy graduated into Diamond Dick and Jesse James, the girl into the Elsie books and silly love stories. Not until the

been tried, in the school room, public library and social settlement home to put life into geography and history lessons, to improve children's taste in reading and just frankly to add joy to the sordid lives of the poor, by story telling. In a country school house a teacher told the stories of the Hiawatha cycle and re-created the red world of America. In Hull House, Chicago, boot-blacks, "newsies" and "little mothers" with big babies, fol-

*Stories
In Libraries
And Other
Public
Institutions*

lowed the careers of King Arthur and his Knights for many weeks, until a boy ran out crying that the "good king" was dead! In libraries, children doubled up with laughter over the comical negro yarn of The Tar Baby, or followed with breathless interest the voyage of Jason for the Golden Fleece; and they went home with Uncle Remus or Hawthorne's Wonder Book.

*Teaching
Story
Telling*

Then—all at once, it seemed—normal schools and kindergarten and library colleges had courses in the theory and practice of story telling. Ancient and modern classics began to be ransacked for material, by trained writers and educators, and publishers vied with each other in putting the tried and true-blue stories into usable shape for the story teller and the children.

Revival of the Story Teller's Art

Best of all the art of story-telling has been revived. We all know that some people tell stories better than others. It is a social asset everywhere, and of

*An Art
for
Every One*

which mothers and teachers are the chief inventors; a gift that, like singing, writing and painting, can be cultivated. Training in the art involves a study of the psychology of childhood; a knowledge of sources, of dramatic expression and control of the voice, and an opportunity to hear good models. Practice must be had also to learn, each his own capabilities—what kind of stories he tells best.

Effect of Stories in Character Forming

The power of the story to influence conduct always has been understood and consciously used by the world's religious and political lead-

ers, as is illustrated by the hero stories of the Old Testament and the parables of the New. With the close

*Question of
Material
and Method*

study that is now made of the effect of stories on character formation has come a new sense of responsibility. "A story," told in any way, will no longer do. "What story?" is the question and "When?" and "How?" What story should be told to any particular child or groups of children at a given age? Are they four years old, or ten or fourteen? What are their interests? Are they of American or foreign birth? Do they know and love animals? Are they city or country children? What sort of people do they admire and try to imitate? What do their lives lack of practical experience and mental and moral stimulus?

Why Primitive Stories Interest Children

Broadly speaking, every child repeats, in his growth from infancy to manhood, the experiences of the race. In the classical rhymes, fables and tales that have perennial charm are preserved the ideas and ideals of nations at every stage of their development. The jingle and non-

*Why Non-
sense Rhymes
Attract*

sense rhyme grew from a crude sense of music and of humor, and they tickle the fancy of the smallest children who are in the primitive stage. It is exciting and funny, but not absurd, that the cow jumped over the moon and the little dog laughed. A baby cries for the moon thinking it within reach. His toes are playmates readily conceived as little pigs—papa's foot is the cock-horse going to Banbury Cross; Santa Claus and brownies and fairies are real people. Before these nonsense rhymes are exhausted, a child is ready for The

House that Jack Built, The Three Bears, The Little Pig that Wouldn't Go Over the Stile, and other rhythmic stories. These narratives consist of a few familiar elements touched with mystery. They are all

Why Children Like Repetition action; each event is a complete image, and the repetition knits the incidents together, relieving the strain on attention. The child finds the same pleasure in the recurrence of a phrase or sentence that a grown person feels in the recurrence of melody in music.

Before a child enters the kindergarten he should know the nursery favorites that can be had for a few cents, and with gorgeous illustrations, in any book store or toy shop. He should know such fables as The Lion and the Mouse, and The Tortoise and the Hare, and should have learned to laugh at such humorous stories as The Greedy Cat and The Wise Men of Gotham. Little children need to have their taste in fun cultivated. The comic sections of newspapers with alleged humorous deformities, trickery, vulgarity and impudence, should not amuse them.

Good Humor—Not Cruel Humor

A funny story belongs to every age. It is a sad world to one who cannot laugh; an inhuman world when it seems funny to see a dog tormented with a tin can rattling at his tail, or a passer-by injured by a slip on a banana skin.

And children who have never laughed with Uncle Remus, or known the comic animals of The Jungle Book or the delightful absurdities of Alice in Wonderland, will hardly be able to appreciate Mark Twain and Don Quixote and the great comedies of the drama.

Good Stories are Good Teachers

There are, of course, thousands of funny stories—good, bad and indifferent. Story tellers should draw from all sources, for the folk-lore of each people reflects their racial characteristics. They introduce children to strange people and far-away places sympathetically, and pave the way to understanding of geography, history and literature. The code of ethics of the good fairy story is sim-

Where the Good Always Triumph

Cinderella



ple and strong—good always overcomes evil. A typical one is that of the gentle and loving girl, whose beautiful lips dropped pearls when she spoke, while the ill-tempered, selfish one's mouth dropped toads.

Old Stories that Need Editing

But a few of the favorites need modification. For obvious reasons the cruel step-mother should be omitted from Cinderella. In Red Riding Hood the wolf is no longer allowed to eat the grandmother. Indeed, the dear old lady is clever enough to outwit him by crawling under the bed.

When Your Baby Meets the Fairies

Fairy tales, with their wealth of color and incident, cultivate the imagination. Without imagination, human beings are "dull, driven cattle," without joy, initiative or invention. Without it no one could build a

*The
"Star Dust"
of Old
Mythologies*

house or furnish it, design an engine, get a dinner or make a dress.

And fairy stories have come to be treated with vast respect since it has been discovered that childhood's classics have found place in epics and have been given new form in modern poems and paintings. The adult finds the Sleeping Beauty again in lyric by Tennyson and in Wagner's opera of Siegfried. Aeolus and the Bag of Wind, the college youth finds in The Odyssey. Other stories of unknown origin and no special honor refuse to die, and chance illusions to them call up vivid images—Aladdin, the splendid East, The Ugly Duckling, the cold North. In libraries, fairy stories are characterized as "non-fiction," for they were not invented, but grew as naturally as trees. They are the star

dust of old mythologies—crude poetic attempts to explain the universe by prehistoric peoples. A few fairy stories of merit have been invented in Modern times, but compared with the old ones they have small vitality.

The Mission of the Myths

The Greek, Norse and Indian myths should be given to a child as early as he can grasp them. The myth is, as one writer puts it, "The Voice of a people calling on God."

*Explaining
the Wonders
of Nature* It, too, is the story of explanation of the universe before natural laws were understood. In myths is the daily glory of the sun, the wonder of water and fire, frost and storm, plant and animal life. So many of them are stories of flowers, birds, rivers and animals, they awaken in children a love of nature and quicken their observation. The sun is the chariot of Apollo, the moon, of Diana, the rosy dawn, the garment of Aurora. Under a volcano is the forge of Vulcan. Neptune rides the stormy sea. Thunder is the bolt of Jove or Thor. A child can understand the story of Arachne the spinner, and get some notion of the amazing cleverness of the garden spider. He can learn the useful lesson of curbing idle curiosity in listening to the story of Pandora's Box, and the pleasures of hospitality in The Miraculous Pitcher.

The Greek and Norse mythologies furnish stories of great variety, but the American Indian and Negro myths are more primitive and have an earlier appeal. The stories of Uncle Remus are nature myths. Many of them originated in Africa, and they are a pathetic revelation of the unresisting black race, as timid and

*Indian and
Negro
Myths*

helpless as Br'er Rabbit. The shifts and craft to which the animal is put to outwit his foes, inject sympathetic understanding into the race question. But he makes no maudlin appeal, and for pure fun there are no better stories. The childish ideas, the dialect and the quaint charm of ingenuousness are inimitably humorous.

Hiawatha is our epic of the red man—the single example of an epic of modern invention. It lives because it is based on the genuine myths, legends and traditions, and in form it is primitive, being modeled after The Kalevala, the Finnish

*Wide
Interest of
the
Hiawatha
Stories*

Epic—rhythm and repetition without rhyme. Its pictures of wild American life, in the forest and by the stream,

its love of nature, its religious ideals, and its heroism are authentic. And the cycle of stories is in the true epic style, grouped around the birth, life and death of a national hero. No other story in literature is so well fitted for use with a great number of young children. In the school room it may be made the basis of months of work in oral and written English, in drawing, modelling, history, geography and, finally, of dramatic representation.

The Epic Compared with the Fairy Tale

The stories of Ulysses, Beowulf, Siegfried, King Arthur and Roland come later. These legendary cycles form the link between the myths and

*Striking
Example of
the Spiritual
in Boys*

history. The epic has all the good qualities of the fairy tale, plus the continuity and completeness of biography. King Arthur's life is as full of action and as romantic as that of the hero of a dime

novel. It is a "continued in our next" story that may run through the story hour week after week, and may be divided into chapters, each one complete in itself but exciting interest in the next. In a small park library in Chicago, nearly a hundred boys left the skating pond to listen to the spiritual adventures of The Quest for the Holy Grail. The Round Table stories are usually told in logical order: The Coming of Arthur, Launcelot and the Giants, Founding the Round Table, The Knighting of Sir Tor, Gareth, The Kitchen Boy knight, The Holy Grail, Sir Galahad, Launcelot and the Tourney, Launcelot and Elaine, Enid and Geraint, the Last Great Battle and The Return of the Sword Excalibur, Guinevere at Amesbury.

When All Boys Are Knights

This is a model for telling all the epic stories. Ulysses, Beowulf and Siegfried interest children as young as ten, but Arthur comes later. He is the British hero of *And Girls Like Knightly Deeds* chivalry and Roland is the French. In the early years of adolescence every boy is a knight. He admires both physical and moral courage. Robin Hood and his merry men in Sherwood Forest also captures the boy of this age and there is great value in the attractive pictures of out-of-door life and manly sports, and fine literary standards in the old ballads, but these things are off-set by making a hero of an outlaw. The story should be given later in the adolescent period when young people can be interested in studying the historic setting—the abuses of a time that preceded, the conditions that produced such a redresser of the wrongs of the poor, and made of him a popular hero.

Robinson Crusoe

**Special Appeals to Girls**

Up to a certain age, the same stories appeal to both boys and girls. There is no sex in the arts. But since men are the chief characters in the great stories, pains should be taken to emphasize the part that women play. Penelope, Brunhilde, Maid Marian, Elaine, Enid, Lynette, Minnehaha, should be impressed as important personages on both boys and girls. And the girls have their own epic heroine in Joan of Arc, and many a notable figure in myth, legend, history and fiction. There are St. Elizabeth of Hungary, Molly Stark, Jeannie Deans, Juliet, Portia, Florence Nightingale, Grace Darling and other heroines whose deeds inspire.

Introduction to the Love Story

When sex feeling awakens, it should have proper recognition in stories of noble and romantic love, such as those of Dante and Beatrice, Jacob and Rachel, Romeo and Juliet, Lincoln and Anne Rutledge, Enoch

Arden, Evangeline. Such stories that dignify love will help young people to get safely over the silly period. This phase of adolescence is helped also by stories of Moses, David, Joseph, St. Paul, Luther, St. Francis of Assisi, Father Damien and other religious heroes, and in introducing the young people to Dante and Milton; for this emotional period is the one in which religion most strongly appeals.

True Stories of Men and Nature

To tell history stories one need not wait until children begin to question: "Is it a true story?" But just as soon as the question comes, the children are ready for the true nature story and the historical tale dealing with authentic characters. Now, there are many scientific accounts of the habits of animals and many fascinating stories of animals, but there are few accurate studies of animal life that are, at the same time, tellable stories. Aesop is not scientific,

*Place of the
Animal
Story*

nor is Uncle Remus nor Black Beauty, yet all these are valuable. The main purpose of the animal story is to foster a sense of intimacy and brotherhood with lower life. Ernest Thompson Seton's sympathetic studies are in the best form for the story teller. So are Kipling's Jungle Book and the works of G. C. Roberts and William Long. In the books of John Burroughs and Olive Thorne Miller is much material that can be adapted by the clever story teller. Besides Rab and his Friends and other dog stories of Dr. John Brown, and Ouida's Dog of Flanders, there are a number of collections of true dog stories. The point is that the boy who can be brought to like intimate peeps into animal life will graduate into an appreciation of Burroughs, Thoreau and good old Isaak Walton. And he will not torment cats and dogs nor rob birds' nests.

Some of the True Dog Stories

Stories About Historic Personages

Of true histories, there is an embarrassment of riches. A great number of them, such as that of Whittington and His Cat, Bruce and The Spider, William Tell and The Boy Who Saved the Dyke, are half legend, but are stories of historical persons and, like that of Washington's hatchet and Captain Smith and Pocahontas, they refuse to die. Every one of them bears a moral lesson so simple and strong that very young children can grasp them. As with the legend, the history stories that are told to children should be full of adventure and the spirit of youth. The lives of Franklin, Jefferson and Goethe are inspiring to grown people, but immature minds

Stories That Are Half Legend

cannot appreciate such quiet lives. But they can understand stories of high ideals, moral courage and deeds of great human service, so these qualities are brought out in action, and that without using the swash-buckling military conqueror. "Who was Alexander, pa, that people call him great?" the child asked in the old poem. He was much more than a fighter, to be sure, as were Caesar and Napoleon, but a child cannot understand constructive statesmanship, and history does not present the lovable human side of these world subduers as it does of King Alfred, Joan of Arc and Washington. The very best of all statesmen and patriots to give the child is Lincoln; the best modern military hero, "Chinese" Gordon. If Gordon had lived in the old days he would have been the hero of an epic, so varied and splendid were his adventures and deeds; so noble his character, so heroic his death. Lincoln is the one true epic figure that has been produced by our brief history.

Explorers, Pioneers and Heroes of Invention and Service

Of explorers, Columbus towers above all other heroes, and LaSalle and Sir John Franklin are appealing figures; of patriots, the story teller may well choose Nathan Hale and Arnold Winkelreid; of backwoodsmen, Daniel Boone, Audubon the bird lover, and Johnny Appleseed, the pioneer orchard planter; of pathfinders, Lewis and Clark and Zebulon Pike; of naval fighters, Paul Jones, Farragut and Nelson. But it must not be forgotten that there are heroes of science, invention, the arts and industries,

Danger of the Military Hero

The Child's Heritage of Heroes

literature, philanthropy and mercy—Davy, Watt, Moore, Thorwaldsen, Beethoven, Tolstoi and Stevenson, Florence Nightingale, Palissy, Father Damien. Stories of heroic policemen, engineers, firemen, wireless operators and health officers have been collected and are now a part of the study of civics.

Work of the "Story Lady"

Outside of the folk tale, that time has stripped of superfluities, there are few stories that are in just the right form for telling orally. A good "story lady" will analyze any story, reduce one too long, amplify one too short, gather from other sources local color and detail that is lacking, cut out tedious descriptions and unnecessary people and incidents.

As no singer sings all songs equally well, so a story teller must, by watching effects, learn her limitations. A good rule is that she should never tell a story in which she herself is not interested. She should feel its fun, its pathos, its nobility, and laugh and shed tears with her audience. Then she should face a half circle of children, if possible, and tell her story simply, directly, dramatically, with zest as "little orphan Annie" told her stories. Children should never be talked down to. They follow a story that is far beyond their ability to read. Nor should the moral be pointed out. In a really good story the moral will take care of itself. The test of success is a big-eyed audience listening with breathless interest—then a long-drawn sigh of happiness, then a "Please tell another one!"

If well told, in school, the chil-

dren will always want to talk about a story, write about it, draw, paint and model it, dress up and act it, ransack reference books to find out more about it, live it. In Forestville School, Chicago, the children have for years presented such plays as Shakespeare's "Midsummer Night's Dream" intelligently and charmingly, designing costumes and stage scenery. After a library story hour, the children want the books in which the same or similar stories are found, to take home to read. And the books should be on hand to be read while interest is fresh.

Giving Variety to the Program

A story-hour program should have variety. There should always be a humorous story, a nature story or myth, a hero story and—for little children—a rhythmic or fairy tale. For older children, where the same ones can be brought together once a week, an epic should run serially. Then there should be a biographical hero story, a nature story and a humorous one, such as Don Quixote and the Windmill. For example, a good Christmas program for little people would include the Indian myth, "Why Evergreen Trees Keep Their Leaves in Winter" (Nature Myths by Holbrook), "The Bird's Christmas Carol," by Wiggin, to teach the duty and pleasure of sharing with others; the story of "Snow Baby" (Peary's little daughter who was born in an Eskimo village) and "The Greedy Cat," a rhythmic fairy tale that, in a humorous way, describes the penalties of over eating. This is in Dasent's Norse collection. For older children, Howell's "Christ-

*Great
Educational
Value
of the
Story*

*Personal
Interest
is a
Guide*

*Seeking
Fresh
Material*

Aesop

mas Every Day in the Year" supplies the fun; John Burroughs' account of his little wild winter neighbors, the nature interest; the story of Sir John Franklin, heroism, and "The Vision of Sir Launfal," "The Other Wise Man" or "When the



Chimes Rang," the spiritual meaning of Christmas. The story teller should avoid the stereotyped, and should hunt for the little known. The best success cannot be had without a wide knowledge and appreciation of the best in literature.

Story Books and Books About Story Telling

Text Books. Stories to Tell Children and How to Tell Stories to Children, by Sara Cone Bryant; Story Telling, What to Tell and How to Tell It, by Edna Lyman; The Story Hour, a magazine published in Washington, D. C.; The Story Hour, by Kate Douglas Wiggin and Nora E. Smith; Some Great Stories and How to Tell Them, by Richard Thomas Wyche.

Sources of Rhymes, Fables, and Fairy Tales. Mother Goose, Aesop's Fables, The Nursery Rhyme Book, collected by Andrew Lang, the works of Hans Christian Andersen, Jacob Grimm, The Arabian Nights, collections and translations by Andrew Lang, Joseph Jacobs, Sir George Dasent, Johnson, Scudder, Laboulaye. Kipling's Jungle Book and Just So Stories and the Golden Window, by Laura E. Richards, should be in every library. Compton has collected Indian fairy tales and Ozaki, Williston, Roulet and Dutton, the Japanese. Donegal Fairy Stories are retold by the Irish writer, Seamus McManus.

Myths. Nature Myths by Flora J. Cooke, Nature Myths and Through the Year in Myth and Song by Florence Holbrook. Old Greek Stories by the poet, Josephine Preston Peabody, Greek Heroes by Charles Kingsley, The Wonder Book and Tanglewood Tales by Hawthorne, Wigwam Nights by Dr. Charles Eastman, a full blooded Sioux, Wigwam Stories by Judd, The Basket Woman by Mary Austin. Norse myths have been collected by Guerber, Hamilton Mabie, Sarah Bradish, and Sir George Dasent, Myths of the Middle Ages by S. Baring Gould, Gleanings in Buddha Fields (Japan) by Lafcadio Hearn.

Epics and Legends. Hiawatha by Longfellow, The Odyssey for Boys and Girls by Church and by Andrew Lang, The Golden Age by Baldwin. A story teller should have the original Mallory on the King Arthur Cycle, but work from Tennyson's Idylls of the King, and from Sidney Lanier's Boy's King Arthur or How-

and Pyle's three books. Marshall's is the standard account of Beowulf, the Saxon hero, and this is well told by Madame Ragozin, the author of similar condensations of Siegfried and Roland. Baldwin's Roland and his Siegfried are good. The Cid (Spanish legendary hero) by C. D. Wilson, Sigurd the Volsung (Norse and Icelandic) by William Morris, Rustem the Wonder Child (Persian epic of Shah Nameh, rivalling the Arabian Nights), translated recently by Elizabeth Reninger, The Kalevala (Finnish), translated by Crawford. Joseph Jacobs, Lady Gregory and other Irish writers have collected many tales of Ireland's heroic periods of Cuchul-lin and of Finn.

Nature. Wild Animals I have Known, Lives of the Hunted, Animal Heroes and other books by Ernest Thompson Seton. Uncle Remus books by Joel Chandler Harris; Jungle Book and Just So Stories by Rudyard Kipling; the works of William Long, G. D. Roberts and Dallas Love Sharp, Animal Story Book by Andrew Lang, Pierson's three books on Farm, Meadow and Night People, Animal Studies by John Burroughs and Bird Books by Olive Thorne Miller, Rab and His Friends and other Dog Stories by Dr. John Brown. Dog of Flanders by Ouida, True Dog Stories by Sarah K. Bolton and The London Spectator, Black Beauty, Greyfriar's Bobby by Eleanor Atkinson.

Biographical: Baldwin's Fifty Famous Stories, Lang's True Story Books and Children's Hero series, Poor Boys and Poor Girls who Became Famous by Sarah K. Bolton, Life Stories for Young People by Upton, Days of Alfred the Great and Days of William the Conqueror by Tappan. Brave Deeds by Trowbridge, Stories of Old France by Pitman, Historic Boys by Brooks, Joan of Arc by Francis C. Lowell, Boys' Book of Famous Rulers by Farmer, American Hero Stories by Tappan, Discovery of the Old Northwest by Tappan, Pioneers of the Mississippi Valley by McMurry, Boys' Life of Napoleon, of William Tell and of General (Chinese) Gordon by Marshall, Robert Bruce by Jeanie Lang, Boys' Life of Lincoln by Helen Nicolay, The Boyhood of Lincoln by Eleanor Atkinson, Heroes Every Child Should Know by Hamilton Mabie.

Miscellaneous Stories in General Literature. Chaucer's Canterbury Tales, Longfellow's Tales of a Wayside Inn, Evangeline and Miles Standish (Puritan Life and Character), When the King Came (New Testament Stories) by Dean Hodges, Tales from Shakespeare by Charles and Mary Lamb, Ruskin's King of the Golden River, Miss Mulock's Little Lame Prince and The Adventures of a Brownie, and Oscar Wilde's Happy Prince are modern fairy stories that rank with the classics. E. E. Hale's Man Without a Country, Van Dyke's The Other Wise Man and the First Christmas Tree, Lowell's Vision of Sir Launfal, Lew Wallace's The First Christmas, Kate Douglas Wiggin's The Bird's Christmas Carol, Howell's Christmas Every Day in the Year, Dickens' The Chimes, Alder's Why the Chimes Rang, Maeterlinck's Blue Bird, Barrie's Peter and Wendy (Peter Pan in story form, Mrs. Wiggin's Timothy's Quest, Dickens' The Cricket on the Hearth and A Child's Dream of a Star, Robinson Crusoe (self-reliance cycle), Ouida's Bimbi and the Nürnberg Stove, George Eliot's Eppie and the Miser from Silas Marner, Browning's Pied Piper of Hamelin, Irving's Legend of Sleepy Hollow, Stevenson's Markheim and Will-o-the-Mill, Tennyson's Enoch Arden, Poe's The Gold Bug, Fouque's Undine, Goethe's Hermann and Dorothea, Mrs. Burnett's Fauntleroy, Edytha's Burglar, Sara Crewe and The Secret Garden, Lafcadio Hearn's Nun of the Temple of Anida (Japanese, in Kokora), Story of Jeanie Dean in Scott's Heart of Midlothian, Scott's Lady of the Lake and The Lay of the Last Minstrel, Thanksgiving at Plumfield Farm in Louisa M. Alcott's Little Men, Alcott's Joe's Boys, Howell's When the Turkey Turned the Tables, Wiggin's Story of the Lilac Bush, Mary Mapes Dodge's Hans Brinker and the Silver Skates, Hawthorne's Great Stone Face and the Story of Hilda in The Marble Faun. Selections from Gulliver's Travels, Don Quixote and several of Mark Twain's books, McLaren's The Bonnie Briar Bush. A collection is now to be had of the stories of the children of Charles Dickens. These are a few of the many beautiful stories to be found in general literature that the story teller may adapt for oral use for varying ages.

Three Bugs

*Three little bugs in a basket,
And hardly room for two!
And one was yellow, and one was black,
And one like me, or you.
The space was small, no doubt, for all;
But what should three bugs do?*

*Three little bugs in a basket,
And hardly crumbs for two;
And all were selfish in their hearts,
The same as I or you;
So the strong ones said, "We will eat the bread,
And that is what we'll do."*

*Three little bugs in a basket,
And the beds but two would hold;
So they all three fell to quarreling,—
The white, and black, and the gold;
And two of the bugs got under the rugs,
And one was out in the cold!*

*So he that was left in the basket,
Without a crumb to chew,
Or a thread to wrap himself withal,
When the wind across him blew,
Pulled one of the rugs from one of the bugs,
And so the quarrel grew.*

*And so there was war in the basket,
Oh, pity 'tis, 'tis true!
But he that was frozen, and starved, at last
A strength from his weakness drew,
And pulled the rugs from both of the bugs,
And killed and ate them too!*

*Now when bugs live in a basket,
Though more than it well can hold,
It seems to me they had better agree,—
The white, and the black, and the gold—
And share what comes of the beds and the crumbs,
And leave no bug in the cold!*

ALICE CARY

LESSONS AT HOME AND AT SCHOOL

DRAMATIZATION BY CHILDREN

How to Play You Are Somebody Else



ONCE there was a lady who wanted to give a Christmas present to a dear little girl friend. What should it be? Not *a* present, that anyone could go into a store and buy, but *the* present that would be mixed up with o-o-oh the best times! What do you suppose it turned out to be?

A "play lady" dress!

What One Lady Did

She remembered that, when she was a child, next to dolls she just

loved to dress up in an old, rusty silk gown of mother's, a hat with a feather, a lace parasol, and go calling. She was careful to visit only those neighbors who would not laugh, but could make believe she was really grown up.

So she made a lovely "play lady" dress out of an old, sapphire-blue satin coat lining. It had a train, lace ruffles and sparkly buttons. That

*Don't You
Play Lady
Too?*

*The Boy
Indian*

was such a bright idea that she made a boy an Indian costume, with a fearful feather head-dress. Such squealing over those presents!

The Joy of "Just Pretending"

You love to pretend you are some one else, don't you? It's just as easy! All you have to do is to say: "Let's play like," and you are queens, knights, fairies, pirates or animals. You can play "keeping school", be

Queens, Fairies, Knights and School Teachers

castaways on a desert island, be pirates, or lovely maidens imprisoned in towers, or play house-keeping and have tea parties. You don't really need costumes or stage setting, or anyone to look on and clap hands. But sometimes, at parties, you play charades, making up a play on a word, or you have tableaux.

Play Actors in "Little Women"

But wouldn't you like to act a story play? You can do it, really. In Miss Alcott's story of "Little Women", Jo and Meg, Beth and Amy and Laurie acted plays in the attic or barn. Jo was the clever, literary girl. She wrote the little plays herself, and each one took five or six parts. Jo liked to play villains and ghosts and haughty queens.

Five or Six People in One

Meg was always the fair maiden with a lover. Amy was the fairy queen, and Beth the messenger. They had such fun making their costumes out of rags and tags and old velvet gowns; in turning carpenter to put up a stage; in painting

scenery on old sheets. They did everything themselves; and when they lacked anything, the people who came to see the plays had to use

A Modern Court



Three lines deep at the back stand the sturdy Sixth Grade knights of the Table Round of the University School, Detroit. Brave Sir Launcelot, Sir Galahad, Percival, and Bedivere—they are all here with their armor, helmets, spears and ribbon sword-bands. In front are the Fifth Grade pages and squires, in training for knighthood but not yet deemed worthy of that honorable estate.

their imagination, as Jo said.

Why Not Do It in Your School, Too?

You could do that, too. The "little women" were natural girls, not a bit more clever than could be found, perhaps, in your school. All children are good at making believe. Once

people did not think anything of this, except that it was a way that little people had of amusing themselves. But now, wise men and

of King Arthur



Each is squire to a particular knight and wears that knight's colors. At the left is King Arthur himself viewing this gathering of chivalry. Near him stands his royal bugler. In the center is King Arthur as represented by the children, gorgeous in royal purple robes and a golden crown. Below him is his jester, ready to make the court merry with his antics.

women, who really study children say that this love of play acting should be made use of in education. Dr. Eliot, late president of Harvard University, has said: "Here is a tremendous power that should be used by every school in the country, and I believe that it is going to be."

What a Wonderful Little Big World

Tell mama and teacher about that. Play acting is used in every kindergarten. The cunning little tots are flying birds, trotting horses, busy bees, growly bears, hammering blacksmiths and carpenters. Every little game and folk song has its action, helping to fix the idea. And in the first grade, children build up Indian villages, on sand tables, making arrows, tents, canoes and warriors out of paper, clay, sticks and colors. After that, in the middle grades, it is more a matter of books. And those are the years when boys and girls play make believe most, out of school hours.

*The Post
Actors
in the
Kindergarten*

How to Give a Fine Play

But if you had a chance to give a *real* play, with a story in it, and printed parts to learn, wouldn't

*Happy
Work for
the Boys
and Girls*

you study hard to do it right? You would scour libraries to find out all about the historic period, the proper scenery and costumes. The boys would work after school hours and on Saturdays, to make a stage on the platform of the school assembly hall. They could screen off dressing rooms with denim or burlaps, hang a front curtain, make exits at the back, right and left. The girls would design

and make the costumes of the cheapest materials—cheesecloth, cambric, cotton crepe and tissue paper. Curtain cords, old feathers, paper flowers, tinsel from the Christmas tree, shawls and blankets can all be used. A fine Roman toga can be made from a sheet. The furniture, too,

A Thanksgiving Play



© Harper Bros. Little Plays

The Spirit of Thanksgiving is reading his list of names to see if it can be true that two poor little girls and their mother have been overlooked. This is a scene from a play in Harper's Book of Little Plays.

should be simple. An arm chair draped with a shawl makes a fine throne; a spring cot with a blanket or rug makes an Oriental divan. Rocks and caves are made of boxes piled up and covered with burlaps or sacking. A background scene can be sketched with charcoal and crayons on print or wrapping paper, or glazed cambric.

And Then Comes the Play

But the play! There are plenty of plays printed in books, and written especially for children. They were written by teachers and authors of young people's stories, and published by the school book companies.

Where
to Get
Good Plays

One book can be bought and the parts copied for the actors to study. There is one "Book of Plays for Little Actors" for children of the second and third grades. The plays are short, in one act, with many walking parts for little folks too shy to speak, but who thus learn to appear before an audience without being frightened. The speeches are short, too, and easily learned; the plots simple.

Every child has heard about the pussy cat that went to London and saw a mouse under the Queen's chair. A dear little play has been made of that, with Pussy and her mistress in it, the Queen and her

A Royal Court



© Harper Bros. Little Plays

Here a princess and a brave soldier are bowing before the throne of a king. If you are a little boy, don't you think it would be fun to command the kneeling princess to rise, with a sweep of your robe and your very lordliest bow? And if you are a little girl, I know you would love to be the pretty fairy in the filmy white dress and wings.

maids and the mouse. A play has been made of Mother Hubbard and her dog, Tom the Piper's Son and other old nursery stories, like Red Riding Hood and the Three Bears. A boy with a fur coat and cap makes a fine bear.

Turning History Into Plays

For children a little older, there are Hiawatha and Puritan plays.

*American
History on
the Stage*

In the play of "The First Fourth of July," the time is 1776, the place Philadelphia. Everyone wears colonial dress of buff and blue, with cocked hats. The old bell ringer

with his grandson is seen on his way to Liberty Hall. The signers of the Declaration crowd about a long table. People shout behind the scenes. The stories of the first Thanksgiving, of Washington and the cherry tree, and Lincoln and the little bird have been made into plays and there are stories from history and biography, furnishing a great number of simple, dramatic plots that even little folks can act out.

Longer Plays for Older Children

For older children there are longer plays, with more characters. The Pied Piper is a beautiful

Thanksgiving Day

drama in which many little and big children can act. Such stories as that of William Tell, Nathan Hale, Daniel Boone, Joan of Arc, Captain John Smith and Pocahontas, The Ugly Duckling, Eppie and the Miser from Silas Marner, and others dear to the heart of childhood, are very fine for acting. You learn many things in doing them well. You learn the best stories in literature. You learn the beauty and force there is in good English. You learn to stand and walk easily and gracefully, to speak clearly and with expression. Most of the books of plays for children have stage directions and descriptions of costumes. Some of the plays can be given out of doors, on a lawn, in a park or grove.

And Shakespeare Himself Looked On!

It may help you to think you could give a play in your school or home, to hear what others have done.

Shakespeare Played Before Shakespeare In Lincoln Park, Chicago, there is a statue of Shakespeare, seated in a marble chair. On the poet's birthday the children of the Junior Dramatic League and classes from public and private schools hold a pageant around the statue. Fifteen



© Harper Bros. Little Plays

This is good old Thanksgiving Day with his pumpkin pie and carving knife. Doesn't he make you think of a good dinner with nuts and apples and cranberry sauce? He is one of the Holidays who wanted to rebel against Santa Claus in "The Revolt of the Holidays."

hundred of them marched in procession on one occasion. One group formed Queen Elizabeth and her court, another the actors of the Globe Theater and Shakespeare's friends there. Other bands were characters from his plays—gloomy Hamlet, distracted Ophelia, fat Falstaff; limping, scowling Richard III, wise Portia, dancing Perdita and the shepherds, and many others. The smallest children of all took the parts of Titania, Puck and Oberon and their mischievous band of fairy attendants. It was truly a wonderful spectacle.

How Fairies Study Literature

There is a famous school, too, that begins in the kindergarten to train children to act good literature. One year "A Midsummer Night's Dream" was played in the school assembly hall. The seventh and eighth grade girls designed and made the costumes; the boys did the stage carpentering and managing; the principal parts were acted by fifth and sixth grade pupils. The kindergarten and first year pupils were fairies. The stage was the open platform, decorated with branches and tissue paper flow-

Midsummer Night's Dream at School

ers. The seats and grottoes were burlap "rocks," the stars electric lamps. The actors came and went in full view, as Ben Greet's out-of-door company of English players do. It was all natural and beautiful, the children scarcely acting at all, but "making believe," living the sweetest fantasy of the greatest of all dramatic poets.

What wonderful things they learned in presenting that play. And do you think one of those who took part will ever forget it?

Books of Plays

Here are some of the little books

of plays that would be a help to you:

"The Book of Plays for Little Actors," published by the American Book Company of New York. Intended for children of the second and third grades.

"Children's Classics in Dramatic Form," published by Houghton, Mifflin Company, Boston. Five volumes, graded from the first year to the eighth.

"Harper's Book of Little Plays," Harper and Bros., New York. For children of ten to twelve.

"The House of the Heart" (10 plays) and "The Silver Thread" and other folk plays, published by Henry Holt & Co., New York.

"Comic Tragedies." These are the plays written and acted by the little women of the Alcott family, before the age of seventeen. Little, Brown & Co., Boston.

Hamlet's Instructions to the Players

Speak the speech, I pray you, as I pronounced it to you, trippingly on the tongue; but if you mouth it, as many of your players do, I had as lief the town-crier spoke my lines. Nor do not saw the air too much with your hand, thus, but use all gently; for in the very torrent, tempest, and, as I may say, the whirlwind of passion, you must acquire and beget a temperance that may give it smoothness. O, it offends me to the soul to hear a robustious periwig-pated fellow tear a passion to tatters, to very rags, to split the ears of the groundlings, who for the most part are capable of nothing but inexplicable dumb-shows and noise: I would have such a fellow whipped for o'erdoing Termagant; it out-herods Herod: pray you, avoid it.

Be not too tame neither, but let your own discretion be your tutor: suit the action to the word, the word to the action; with this special observance, that you o'erstep not the modesty of nature; for any thing so overdone is from the purpose of playing, whose end, both at the first and now, was and is, to hold, as 'twere, the mirror up to nature; to show virtue her own feature, scorn her own image, and the very age and body of the time his form and pressure. Now this overdone, or come tardy off, though it make the unskilful laugh, cannot but make the judicious grieve; the censure of the which one must in your allowance o'erweigh a whole theatre of others. O, there be players that I have seen play, and heard others praise, and that highly, not to speak it profanely, that, neither having the accent of Christians nor the gait of Christian, pagan, nor man, have so strutted and bellowed that I have thought some of nature's journeymen had made men and not made them well, they imitated humanity so abominably.

The Way the Morning Dawns

*This is the way the morning dawns:
Rosy tints on flowers and trees,
Winds that wake the birds and bees,
Dewdrops on the fields and lawns—
This is the way the morning dawns.*

*This is the way the sun comes up:
Gold on brook and glossy leaves,
Mist that melts above the sheaves,
Vine, and rose, and buttercup—
This is the way the sun comes up.*

*This is the way the river flows:
Here a whirl and there a dance;
Slowly now, then like a lance;
Swiftly to the sea it goes—
This is the way the river flows.*

*This is the way the rain comes down:
Tinkle, tinkle, drop by drop,
Over roof and chimney top;
Boughs that bend, and skies that frown—
This is the way the rain comes down.*

ANONYMOUS

LESSONS AT HOME AND AT SCHOOL THE KINDERGARTEN

The Training of Young Children



A Visit to a Model Nursery School and Kindergarten

THE South American delegate was visiting schools. The guide was Helen's mother, a former kindergarten teacher. Today they were to visit the nursery school and kindergarten.

"I have been looking forward to seeing these schools more than any other," said the delegate. "To me there is no modern development so interesting as this realization of the importance of the complete growth of the pre-school child instead of the physical alone."

"Yes, indeed," replied Helen's mother. "We have come to realize that it is not only important for the child's early growth, but has a profound influence over his entire life."

"Of course for many years educators have realized the necessity of early training for children. At first they thought the first grade the most important, but greater study and experience revealed that an age preceding that was more so, and the kindergartens were formed. After observing the kindergartens closely, they began to realize that the most important years to the child were earlier still; hence the nursery schools."

"At what age are children admitted to the nursery school?" asked the delegate, her eyes aglow with interest.

"It depends on the nursery school," answered Helen's



mother, "they are taken all the way from eighteen months to five years. We do not happen to have any here under two and a half, with a larger number of three-year-old children."

They were now approaching an attractive two-story residence. "This is the nursery school," explained Helen's mother. "You see, it is large enough to accommodate a number of different groups, but each group has an entrance hall, a playroom, bathroom, kitchen and enclosed sleeping rooms with individual beds. In the hall are

rockers, a piano, a victrola and gaily colored pictures hung on the level of the child's eye, gave the rooms an air of charm and comfort.

"You will notice that the kitchen equipment is fully as complete as this," remarked Helen's mother, as she led the delegate to a large kitchen containing ice boxes, hot plates, sinks, low shelves for the children to place dishes and high and low cupboards.

From there she led the fascinated delegate through the bathrooms, sleeping rooms and then outside to the



Courtesy Iowa State A. & M. College.

One of the three aims of the Nursery School is the development of physical welfare.

lockers for the children's wraps."

Rooms Models of Charm and Comfort

"What attractive rooms!" enthusiastically exclaimed the delegate, as they entered large playrooms, having many windows. There were south and east exposures in one, and south, east and north in the other. There were cupboards with broad shelves for the children's use and closed cupboards for the supplies. On the floor was cheerful linoleum and in one room an open grate with a wood fire added cheer. Small, low tables and chairs,

playgrounds, which were enclosed in the back.

There were garden plots, shade trees, and shrubs. "And, there is a small shelter house with a porch for wet days!" exclaimed the delegate. Then she eagerly inspected the equipment which consisted of jungle gym, sand boxes, slides, walking boards, see-saws, large hollow blocks, barrels, packing boxes, wagons, sleds, a rocking horse, rope swings, chair swings and a low turning bar.

"Please tell me more about this wonderful school," pleaded the dele-



Courtesy Iowa State A. & M. College.

On pleasant days, the children's light, wholesome lunch is often served out of doors. Meal time affords a splendid opportunity for training in courtesy and good table manners.

gate, as they seated themselves on a low bench. "It seems similar to the kindergarten, yet vastly different."

"So it is," Helen's mother replied. "It has three aims—the *development of physical welfare, emotional life and personality adjustments*. The earlier right habits are formed along these lines, the better it is for the child's whole future life.

"I wish I had time to go into this more fully, but since your time is limited, I will have to content myself with a brief mention of what I consider the most distinctive service the nursery school renders."

"I suppose you mean the diary records of the individual children, do you not? I think the scientific record of their activities along all lines would be invaluable."

The Nursery School's Greatest Service

"That is very important," answered Helen's mother, "but in my opinion not the greatest service rendered by the nursery school. The thing that appeals to me the most is the contact of the teachers with the parents for the welfare of the child. Our mothers are encouraged to come every day, and they have to agree to come one day each week. We visit the homes of the children often. Once a week we have suppers for the parents and they are made to realize fully that the education of a child is a twenty-four hour problem. We develop in parents a knowledge and understanding of their children that is carried with them through life."

"How intensely interesting. I didn't realize you started the parents as well

as the children. I believe you are on the right path at last. When parents and teachers work together like that to understand the child and create conditions ideal for his progress, you have done much to make solid the educational ladder of your public schools. Does this require a very large corps of workers?"

"Yes, our staff consists of an educational advisor, a psychiatric advisor, an organizing director, five teachers, one supervisor, two critic teachers, two part time teachers in training, a nutrition worker, trained nurse and a secretary. Of course, smaller schools have a smaller personnel. I am sorry we could not come during school hours because I would like for you to have met them and to have seen the children."

"So do I. I would like nothing better than to spend a day here," said the delegate; "but since this also is my only opportunity to see the kindergarten, and I have to make a long report on that, we had better be on our way."

"Fortunately, it is very close," replied Helen's mother, as they rose; "almost next door."

The Kindergarten

Now they were approaching the school. "This building approaches our ideal," said Helen's mother. "It houses the kindergarten and first three grades. It is only two stories high so that little children may avoid the fire and other risks of a large structure with many stairs. Notice the courtyard with space for games, and for the out-of-door hand-work in suitable weather."

"I notice, also," said the delegate, "the yard at the side, laid out in garden beds, and the vines and flowers about the building."

"Yes, the arrangement is similar to nursery schools, only on a larger scale. Each division has a community garden cared for by groups of children who are chosen each season. Some of the children promise to be responsible for the summer care of the garden,

so that there is a good display for their exhibits. There are also individual beds, as you will see by noticing the children's names on the cards placed at each bed.

"As you know, the idea of training young children in pre-school and kindergarten is not really a new thing—but began almost two hundred years

*A Garden
for Little
Gardeners*



"The child is the little artist and has the joy of creation."



During the "sleepy game" the children rest on folds of newspaper laid on the floor. After the nods of "wide awake," they clear the floor—little girls first, then the boys.

ago with Rousseau, the French philosopher," continued Helen's mother. "The educational revolution he inspired in 1762 led directly to the kindergarten.

"Rousseau proposed to consider education, not in terms of 'what is important for men to know,' not in the terms of the essential social skills that may be necessary for *man's* religious, commercial and civic activities; but in terms of the instincts and capacities of each *child*, his mental and physical needs, and his possible achievements at different ages.

"In the preface to his *Emile*, the book that set European educational thought on fire, Rousseau said: 'We do not know childhood. Acting on the false idea we have of it, the farther we go the farther we wander from the right path. Those who are (deemed) wisest are attached to what is important for men to know, without considering what children are able to ap-

prehend. They are always looking for the man in the child, without thinking of what he was before he became a man. Begin, then, by studying your pupils more thoroughly, for it is very certain that you do not know them.'

Froebel the Great Teacher

Over the doorway to the kindergarten wing of the school building was a bas-relief representing Fröebel with a group of children. "This suggests the motto and the spirit of the kindergarten," said Helen's mother. "'Come, let us live with our children.'

"Fröebel, the famous Prussian educator and a pioneer in child study, carried out Rousseau's suggestion to 'study your pupils more thoroughly.' In his three principles, *social imitation*, *learning through expression* and *systematized play*, Fröebel reached three fundamental conclusions, that form the foundation for all education for the child from four to seven, and will

Never Too Early to Make Friends With Books



These children will grow up with a real appreciation of good books. The ones they are quietly enjoying here are their own handiwork. In another department of Pictured Knowledge, you can learn how real books are made.

probably prove of permanent value.

"Young children are intensely interested in imitating, in their play, the activities of their elders, as in playing house, playing store, playing doctor, playing fireman, or conducting business from an office, and thus acquire many useful social ideas, attitudes and habits. This is Fröebel's principle of social imitation.

"The second principle is that of learning through motor expression; the interest of children in building and constructing, modeling in sand and clay, in drawing, singing, skipping and other forms of motor activity. Through these activities children acquire useful information, artistic taste and skill. They also learn to think and to design and so acquire many good habits, which bring enjoyment.

"Fröebel's third principle was that children of his age, as they are today—were commonly interested in the tradi-

tional plays and games of childhood, and that if used systematically, much of the knowledge, skill, enjoyment and moral development necessary to the period might be attained through their play.

"Fröebel lived and played with real children and so came to know their views and characteristics. From his sympathetic understanding of child life he was able to devise a system of child training and materials for occupation based on the laws of growth.

"Fröebel was the first of the modern students of child life. His appeal, 'Come, let us live with our children,' indicates his method of study. His laboratory was a group of children in the home with their mothers, or on the playground following him, their beloved friend and leader.

"Today we are carrying on this same principle, but we do not stop with the gardens, because our life today is so

Modern Interpretation of Fröebel

"The Little Girl Becomes Tender by Nursing Her Dolls"



"The secret of child development is the secret of giving full play to all the inner promptings to activity."

different. The children interpret in their own way all the phases of our complex life. They build airplanes, trains and whatever appeals to them.

"What would you call the underlying theory of kindergarten?" asked the guest.

"To me the aim and practice of the kindergarten is defined by its name, 'Child Garden,'" replied the guide. "A garden is a place of growing things. The duties of a gardener are *cultivation* of the plants. The goal for the child is *growth*, just as it is for the plant. He must grow in wisdom, in stature and in favor with God and man.

"The teacher's goal is a *knowledge* of childhood and of individual children,

in order to give the sympathetic guidance born of such knowledge.

A Model Kindergarten

"What a delightful place it is!" exclaimed the delegate as they entered the kindergarten room. "It is large and sunshiny, and I note that it opens out on the court that we saw when we first came to the building.

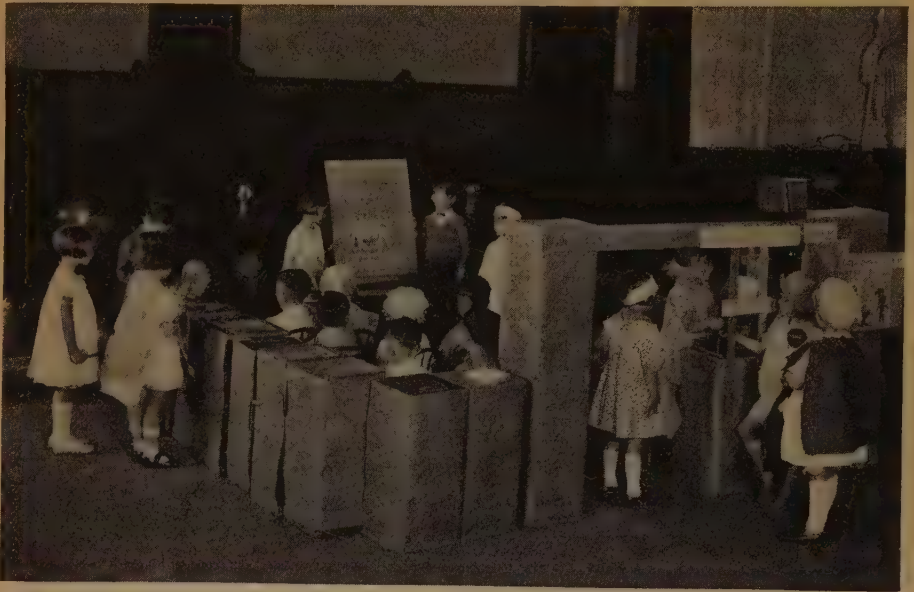
"Everything about this room is different from the schoolroom of a decade ago. I expected a different type of room in the nursery school, but thought this would be much like the primary grade rooms with which I am familiar."

"Yes, it is indeed a cheerful place," said Helen's mother. "The walls are so restful in their two shades of cool



"This is the dolly that I love best."

A Real "Little Theater"



The children decided to add a theater to their community. Colored pictures were cut out and pasted on large cards, with stories underneath, and changed slowly to make a "motion" picture.

green—and notice the blackboard in a darker shade of green, harmonizing with the walls."

The kindergarten teacher was introduced to the visitor, and in answer to her question about the absence of old fashioned stiff desks that were nailed to the floor, said: "The modern kindergarten is provided with tables and chairs of different heights to suit the varying heights of the children—as you see here. These can be pushed back to the walls, or in a corner, thus leaving the floor clear for games or other activities calling for more space.

"The thick cork covering on the floor softens the noise made by little feet, also, by the moving about of tables and chairs."

"What lovely flowers!" she exclaimed, attracted by the boxes of beautiful flowering plants. "And look at the pets, too!" The teacher smiled, "Yes, we have a small zoo almost all the time—a rabbit, two canaries, and

even a tiny turtle one of the boys brought with him one morning."

"When I was a kindergartner," said Helen's mother, "practically our only materials were the Fröebelian 'gifts'—one and two-inch cubes, in sets of eight. Sometimes we had larger ones, but nothing like you have here," and she indicated the shelves and tables which held all sorts of inviting materials—colorful picture books, large building blocks, modeling clay, paints and crayons, and many fascinating toys.

"Yes, they *are* different," the teacher replied. "The change was a gradual one. Careful studies were made of the natural response of children to the usual materials, when they were allowed to select them as they chose. These studies showed that the children found the blocks much more interesting and valuable when they were allowed to use them in quantity and variety. Gradually the building



One small girl said, "Let's build a church"—an avalanche of suggestions followed, out of which came definite plans. When finished, the project was complete in every respect, even to a pipe organ, song books, a pulpit for the minister and pews for the congregation.

blocks were made larger—several times the size of the original tiny cubes which Fröebel called his 'gifts.' Later, toys and books were added to the regular kindergarten equipment, as well as modeling clay, paints and crayons. You will see later that the children use a great variety of articles in their activities."

The children began coming into the room, so the visitors found chairs and
Children in seated themselves. "I
Harmony wonder if the children's
With attitude will harmonize
Surroundings with their surroundings?" the delegate mused, as the slim young teacher left the visitors.

"This teacher is a very human person, isn't she? So vastly different from the old fashioned autocratic person who ruled by stern militaristic discipline."

"Yes, indeed," agreed Helen's mother. "Right now, she is apparently paying no attention to the chil-

dren, though of course she greets them in a pleasant, friendly way. They return her greeting and move about the room in a happy, natural way.

"Our teacher is not as oblivious to her little charges as the casual observer would think," she went on. "Right now, she is quietly taking mental note of what each child is doing. She will use the knowledge gained in this indirect manner, as she works and plays with the children from day to day."

"This leader must be possessed of a vast knowledge of children and their behavior," commented the delegate—"Only highly specialized training could prepare her for the difficult task of assisting each child to think for himself, or with his particular group, as she is doing."

Fun or Play Period

Joining the visitors for a moment, the teacher explains, "This is the fun, or play period. Each child has been

taught to seek his own activity. You can see that they are all orderly and natural. If speech is necessary, they are allowed freedom to express their wishes, either to me, or to one another. The little lad by the window is content to be alone, watching the flowers and the birds. Now, he has decided to join the group building a railroad in the corner. We want the children to learn to be *individuals*, working out their own problems. They have the assurance that I am close at hand, if they need me."

"How unusual, but how splendid!" exclaimed the delegate—"you must be a very wonderful person, so different from the old-fashioned teacher. You seem to be one of the group itself, helping and stimulating, instead of issuing commands to be obeyed blindly."

The teacher smiled at the enthusiasm. "No," she replied, "I am not exceptional; there are many thousands more who have been trained just as I have been. Most of the larger universities have special classes, and experimental schools where the latest methods are taught. Many of these schools have model kindergartens, too, where the young teacher learns under expert supervision, how to put theories into actual practice.

"The children are now forming a ring. The games are indoors today for *The Indoor Games* the benefit of our visitors. We play in the court on pleasant days until late in the fall."

The games chosen by the children were varied. Skipping and running, alternated with such representative plays as "Fly, little birdies, you must go, Soon will come the ice and snow." A good old folk play, "Round about the village," ended the merry circle, and the children were ready for a quiet rest. The sleepy game was played to relax tired little muscles and rest

weary little brains. Only the ticking of the clock could be heard in the room.

"This is our silence game," said the kindergartner. "It helps to preserve the rhythm of movement and rest. It has always been a part of the kindergarten program. Sometimes we use it after the planned work, when there has been special concentration in thinking out some problem of construction."

When quiet time was over, little heads popped up one after another, *Choosing a Game* and the sleepy spell was broken. Nods of "wide awake" were exchanged by the children.

The children assembled in an informal group about their teacher for the planned work of the day. "The leadership still seems to be with the children, rather than with the teacher," the delegate remarked to Helen's mother. "This is surely a revelation to me."

The children talked over a trip made the previous day to a park, asking questions of each other and of the teacher; there was no confusion, no loud talking, just a natural well mannered discussion. After the trip, they began to talk over plans for completing a project they had been working on for some time. They had been building a community, with stores and homes; one small girl suggested they add a church with an organ—someone else suggested a picture show.

"These projects are going to present a great many difficulties and problems; no doubt the teacher will explain these situations and show the children how to avoid mistakes. If she does not, they will have to make a number of changes before they get through," remarked the delegate.

Helen's mother is somewhat prepared, but her South American guest

"Children Interpret in Their Own Way All the Phases of Our Complex Life"



During the school year, one room built an entire community. In this corner of the room are the shops. The children put "make-believe" groceries on the shelves of their grocery store, and from colored crepe papers, made pretty dresses and other articles to "sell" in the "Betty and Bobby Shop."

is intensely surprised—for the teacher falls in at once with the children's plans, discusses the materials necessary, children and teacher both think of and suggest things that can be used, and they begin work.

"I know you are surprised," said the teacher, as she joined her guests for a moment, "but in the modern kindergarten, we wish the children to work out their own ideas, either as individuals or in the group—to find out and correct their own errors. We know that with this training, children will be *thinkers, not followers*—they have intelligent minds and are taught to use them."

"Yes," added Helen's mother, "a child can attain far more growth by working out his own solutions to problems, than by having someone else do his thinking for him."

"This is well named the occupation period," said the guest.

"Yes, it really occupies. See how alert are eye and hand," the kindergarten answered. "It gives the best industrial training, because it promotes a love of work. The training of the hand Fröebel deemed of importance from the very start, in order that what the children produce later may have real worth. But the fine arts are needed, too, to make life fine. Life is more than meat, and body than raiment. Industrial training alone may develop ability to earn a living, but not to live. A child loves beauty. He loves to make something beautiful. It may be a windswept landscape made by a few dashes of water color, or a daffodil blooming on a straight stem, or an autumn leaf outlined and filled in with colored crayons. The picture is crude, to be sure. It must be crude; but the child is the little artist and has the joy of creation."

"'Man may see what he maketh,' said Emerson. The little child is an eye. He wishes to look into everything which moves and stirs. He loves to see color and note form. Gradually he begins to know and classify objects, as his perceptions are trained. The kindergarten child who draws pictures of what he sees, who colors the leaves he enjoys, who models in clay a cup or a vase of pleasing form, is daily discovering the lesson of the Rhodora—that

'Eyes were made for seeing,
And beauty is its own
excuse for being.'

"The little girl becomes tender by nursing her dolls; the little boy becomes knightly

Plays by being a
That Teach knight,
Relationships imitation
leads to understanding. A wide range of imitation is necessary to sympathy with man and bird and beast.

"Fröebel left us with typical plays which we have since greatly increased and expanded. The gymnastic value of kindergarten plays you have already noticed," the teacher continued.

"Plays, such as building a railroad, or an entire community with stores, factories, theaters and churches, give some wisdom regarding the world's work, and strengthen the voice within which whispers, 'Work waits for me.' This attitude towards work is also fostered by the hand-work, some of which you have seen this morning.

"The baby loves to do for the sake of doing, but the four or five-year-old

wishes to accomplish something. He wishes to produce. A vase in clay, a paper flower in a tiny pot, or gay
Industry cover for a pad of blot-
Fostered ters, be what it may, it is the child's own, and he has the joy of the maker. The habit of industry is fostered by breeding the love of work."

"I suppose you observe all the special days," remarked the delegate.

"Yes, at special times like Easter, Valentine's Day and birthdays of the fathers and mothers, the work is made into some gift form and taken home," said the kindergartner. "For two or three weeks before Christmas the little hands are busy making tokens of love for home friends. The Christmas tree is hung with gifts and chains and lanterns made by the children and the Christmas festival is shared by mothers and a few fathers who are able to come."



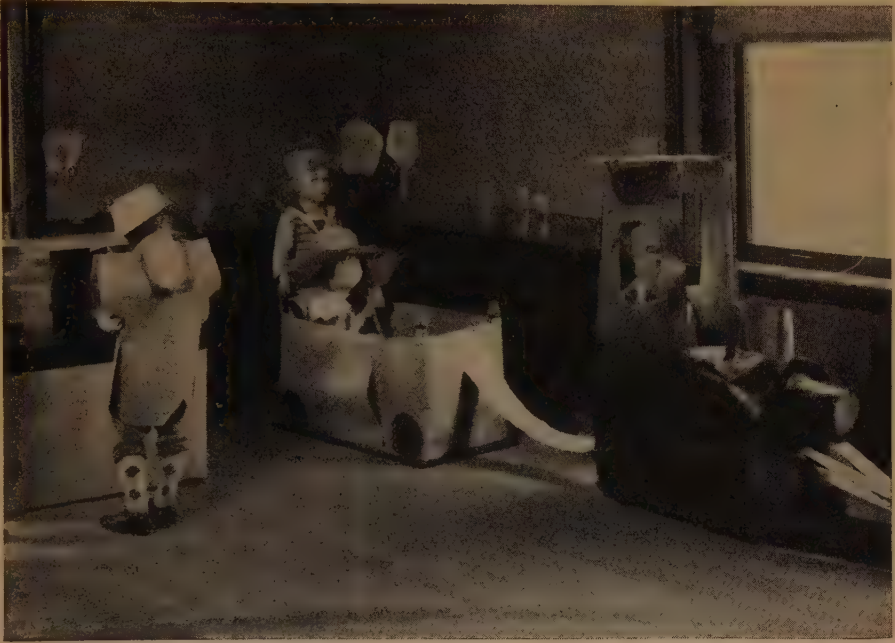
"I learned to put on my own wraps at Kindergarten!"

The Good-Bye Songs

In the meantime, groups of children had been in the dressing room and returned with coats, the boys with hats in hands. "Most of them have learned to dress themselves," said the kindergartner. "The big ones help the smaller ones, if there is a refractory button; and all goes well. Now for our good-bye."

In a group around the kindergartner the children sang:

"Our kindergarten is over, and we are going home,
Good-bye, good-bye, be always kind and true."



A barrel, a packing case, a few boards and some wrapping paper were transformed into a very realistic train by a group of inventive children.

"Let's sing, 'We'll all come back tomorrow,'" said little Joe. Many voices began to sing:

"Our play is o'er, our work is done,
Our things are in their places;
Now to our homes we'll quickly run,
With happy hearts and faces.
We'll say good-bye, but teacher dear,
We'll all come back tomorrow."

With cordial handshakes and good-byes to the kindergartner and to the guests, the children departed.

The canaries were suddenly still and the sunshine flooded the silent room.

"I see that you do not forget the small sweet courtesies," said the delegate. "Now, if you have time, will you explain to me a little further the reasons for some of these things and tell me who was responsible for the kindergarten in the United States?"

History of the Kindergarten in the United States

"The first kindergarten in the United States was opened in Water-

town, Wisconsin, in the home of Mrs. Carl Shurz, one of the well educated German immigrants who came to this country following the unsuccessful revolution in 1848. These people were dissatisfied with conditions in their own country and had come to the United States to find freedom.

"The idea aroused the women of America and others quickly followed in different sections of the country. Elizabeth Palmer Peabody of New England became one of the outstanding leaders of the movement, working tirelessly for many years.

"The kindergarten won early favor as a purely philanthropic movement. The children of the slums were kept off the street, and were made clean and happy. Kindergarten groups sprang up everywhere—in churches and in private homes. It was many years before the idea of correlating the work of the kindergarten with that of the primary grades became popular.

To begin with, there was too great a contrast in methods.

"The kindergarten finally became a part of our public school system, because it supplied a type of education which *harmonized the home and school experiences*, and contributed to the physical well-being of the child. This came about through its own program of activities and by arousing the interest of parents and professional people."

"What was the first public school to adopt the kindergarten?" asked the delegate.

"The first large public school system to adopt the kindergarten was Saint Louis—this was in 1873 and was brought about through the active leadership of Dr. William T. Harris. Three years later at the Philadelphia Exposition, the leaders of the movement established a model kindergarten. This exhibit created a great deal of interest and added impetus to its growth. In 1873 there were only twelve hundred children enrolled in all the kindergartens, today there are more than five hundred times that many. It used to be a rare thing to see a kindergarten in a public school. Today the reverse is true, as most of our schools, both city and country, have well equipped kindergarten rooms, with full or part time teachers.

"But, I am not delivering a lecture on the history of the kindergarten. Of what else shall I speak?"

"Explain to me the purpose of the plays which are carried on in the circle," said the visitor. "Are they for gymnastic training or only for diversion? That is, are the plays merely play?"

Play as "Serious Business"

"No play should be idle," was the answer. "Boys 'fool' and 'roughhouse'

on street corners, because they have no playground and no work shops, because they have not learned how to play. Play, according to Fröebel, is the child's 'serious business.' Into it he puts the earnestness and the effort which a man puts into good honest work. And remember, the man also does best, to whom his work has the zest of play.

"The playground in every town and city is proof of the national conviction that there is a connection between the boy's play and the man's job. The wise Aristotle had little hope for the boy not diligent in his play. He does not promise to be diligent at anything. Fröebel was the first to recognize and utilize the educational value of play. He saw in the child's make-believe a means of understanding. To fly like a bird is to be a bird. To be a father bird or mother bird is to gain interest in bird life. To impersonate is to penetrate the soul of the things represented. Sympathy is awakened and a desire to protect. A new boy had come to kindergarten in the country. The first day he was taken by a group of children to see a ground sparrow's nest in a clump of grass near a rock. The new boy reached out to take an egg. 'Oh, you mustn't do that,' protested the others. 'There's a baby bird in it and the mother would miss it.' The man who 'would needlessly set foot upon a worm' was not bred in a kindergarten.

"Science begins in observation and investigation—and art, in free representation. The kindergarten emphasizes *sense-training* for this reason. A seeing eye and a listening ear mean an awakened mind. The keynote to Fröebel's plan is creation. He desires a busy child, and a happy child. In one of his commentaries on the Mother Play, Fröebel makes a plea for the

training of the hand and also for what he calls a complete activity. He says:

"There is but one means of avoiding wrong activity, but rejoice, friends of childhood and humanity, for it is a sure preventive. This preventive is *right* activity—an activity as persistent as it is fit and lawful—an activity which is not a body activity alone, or yet of the heart or head, an activity wherein are blended body and soul, feeling and thought. To capacitate the child for this pure and complete activity, we must begin in infancy to exercise and discipline hands and fingers.' (*Mottos and Commentaries of Fröebel's Mother Play—Translated by Susan E. Blow.*)

"In the first picture of his *Mother Play Book*, Fröebel shows us a mother sitting with her children on the bank of a stream. The children are playing. One boy has made a water wheel, which is merrily turning in the running brook. His brother is watching and thinking. 'What makes it go?' he is asking himself. He is of the thoughtful type, a future philosopher, it may be. One little girl, vigorous and active, is wading in the brook, while her sister sits quietly by the mother, content to look on. The mother watches and ponders. In each child's play she sees the promise of a future. But no two are the same. Each needs special guidance suited to his temperament and needs. The mother must watch and study and ponder that she may guide wisely. She knows one thing, however, which is true of every child, he

grows and develops through his own *self-activity*. What he does, what he plays, is making him. He must grow in stature, that is in body. He must grow in intelligence. He must also grow in favor with God and man; or, to use the kindergarten phrase, 'he must develop right attitudes towards his playmates, and towards the world which surrounds him.' The secret of child development is the secret of giving full play to all the inner promptings to activity."

"In the Land of the Free"

"You emphasize freedom, do you not?" asked the delegate.

"Yes, freedom is necessary to growth. This freedom is first physical. The baby must kick and play that his limbs may grow strong. The healthy child at home never keeps still. He runs all about the house, touch-



A Play Festival.

ing, testing, experimenting and asking questions. The home is the first school. It is the school of self-activity through which mind and body grow. The mother is the teacher. Her part is to guide, to provide right materials and to answer the many 'Whys' asked by an inquiring mind.

"Now, later, when the child comes into the nursery school, and the kindergarten, is he any different? Is he *Self* not a creature still keenly *Activity* alive and eager to know? To require a child to sit immobile and perfectly still for half an hour is to go contrary to the teachings of his own nature. That is why we have frequent

changes of position and frequent changes of exercise. A child's energy needs relaxation and new channels of expression. The pre-school and kindergarten recognize the fact that mind, like body, grows by use. Self-activity is our method.

"We recognize Nature as the first great teacher. The glory of Fröebel is that he founded a school without books. The story book of Nature is the text book of the kindergarten. Its pages are filled with the songs of birds and the humming of bees. To kindergarten children there are 'tongues in trees, books in the running brooks, sermons in stones and good in everything.' From these things they learn their first lessons.

Reading Things Before Books

"Of what use to master the mechanics of reading, until one has ideas with which to read? Words are barren until life gives them meaning. Dr. Montessori says that her Italian children, who had burst into reading and writing, had little interest in the story books brought them by kind friends. They could call the words, but they were not ready to read.

"A seeing eye, a listening ear, a trained hand and an eager mind"—these are the preparation the kindergarten offers for the school arts. Interest and attention are fundamental forms of self-activity. The native instinct of curiosity is the child's incentive to knowledge. It is aroused by all that surrounds him, about which he wants to know. It is satisfied by directing the child's own self-activity into the pathway which leads to the answer of his many questions. 'Look,' 'Listen,' 'Try again,' 'Work it out.' These are good answers to many questions. The kindergarten materials offer scope for experiment and investi-

gation. Sense plays for touch, smell, taste, hearing and for quick perception are often used."

"Do you ever dramatize literature?" asked the delegate.

"Oh, yes, children need to know about other people, and what they have done.

"History and literature began when the first fathers told their sons the traditions and legends of the tribe. History and literature begin in the same way today. So the kindergarten program includes a story hour. Rhymes, little poems and stories foster the interest in the wonderful world. They quicken the feeling of kinship with living things. Take, for instance, Rosetti's verses:

*Functions
of Stories
and Poems*

"When father takes the spade to dig,
Then robin comes along,
He sits upon a little twig,
And sings a little song.

"But if the tree be very far,
He does not sit alone,
He comes up close to where we are,
And bobs upon a stone.

"Such bits of poetry give form to language, an increased vocabulary, and appreciation of what is good. Stories are carefully chosen for their literary form, their dramatic quality and for their presentation of ideals of life, which kindle the desire to 'go and do likewise.' It is not safe to leave the exercise of the imagination to chance. The most lordly of all faculties should have direction into legitimate channels. We wish to make every mind 'a mansion for all lovely forms; the soul a dwelling place for all sweet sounds and harmonies.' Shall we not help to supply these forms? Shall we not guide in the choice of sounds and harmonies?

"The story is the mirror which shows the child himself. It helps him, therefore, to correct his faults. 'The

story is the strengthening bath for mind and judgment,' says Fröebel. It helps to a right decision between right and wrong and to good moral choice. The *real* story, as the children call it, may bind together the children's experiences, and so serve as a review of the day and an aid to memory."

"The story is a great help in developing the social atmosphere, in teaching children to live in harmony with each other, isn't it?" the delegate asked.

"Yes, and that is very important," answered the teacher. "The social atmosphere of the kindergarten is the great school for the emotions. 'In favor with God and man,' is our ideal. We understand the divine through the hu-

man. We love to serve each other and so serve the common Father.

"In the kindergarten plays a child learns to surrender his own desire. He learns to look out for the weaker and younger. He finds his happiness in the magic of 'together.' In the group and table exercises children learn how to work together, and how to help each other. The public kindergarten is a true melting pot of the nations. Here all are friends and playmates, not rivals. Here all are needed by each one and true co-operation is to be found. The Child Garden is the larger family where all are brothers and sisters."

"A true school of citizenship," said the visitor, as she rose to go.

"The world is to be planted here," replied Helen's mother.



Peter Paul Augustus

(A Kindergarten Song)

*Said Peter Paul Augustus: "When I am a grown man,
I'll help my dearest mother the very best I can.
I'll wait upon her kindly; she'll lean upon my arm;
I'll lead her very gently, and keep her safe from harm.*

*"But, when I think upon it, the time will be so long!"
Said Peter Paul Augustus, "before I'm tall and strong,
I think it would be wiser to be her pride and joy
By helping her my very best while I'm a little boy."*

To the Readers of Pictured Knowledge:

A tree lives on food just as we do. Part of its food comes from the soil; part of it from the air. As with us, all of its food has to be digested before it is made into wood and bark, flowers and fruit. A tree has many stomachs, and these stomachs are, so to speak, at the ends of its fingers; for a leaf is a stomach of a tree.

A forest is a city of trees. Like a city of men, it contains young people, middle-aged people, and old people -- those who are beginning life, and those who are ending it. The tree children -- the seedlings -- differ from human children in this, that all human children ought to live to grow up, whereas most tree children necessarily die while they are young. That is because there is not room in the tree city for all the young children that are born, to grow big in.

A tree can not move about unless some human friend transplants it. It very commonly happens that more seedlings start on a patch of ground than can grow up there, for a healthy tree of middle age often takes as much room as a hundred or a thousand babies. Some of the little trees, therefore, must give way so that the others may live. Which ones survive depends on three things.

The three things which a tree must have to live are light and space and moisture in the soil. So each of the young trees struggles with the others which stand near it to get the three necessities, of which there often is not enough to go round. In this competition for the good things of tree life, the tallest tree usually has the best chance at the light, so the young trees grow upward as fast as they can to overtop their neighbors and reach the sunshine. Also they spread out sidewise as fast as they can in order to get space to live in. Down in the ground, too, the struggle goes on, and each little tree sends out its roots to capture all it can of the moisture which it must have to keep it alive.

Many trees make a dense forest, and a dense forest keeps the soil rich and moist. A rich, moist soil is good for trees. So, although the effect of the struggle that crowds the trees together is that many seedlings must perish, one effect of it is to produce conditions which are favorable to the growth of those that live through it.

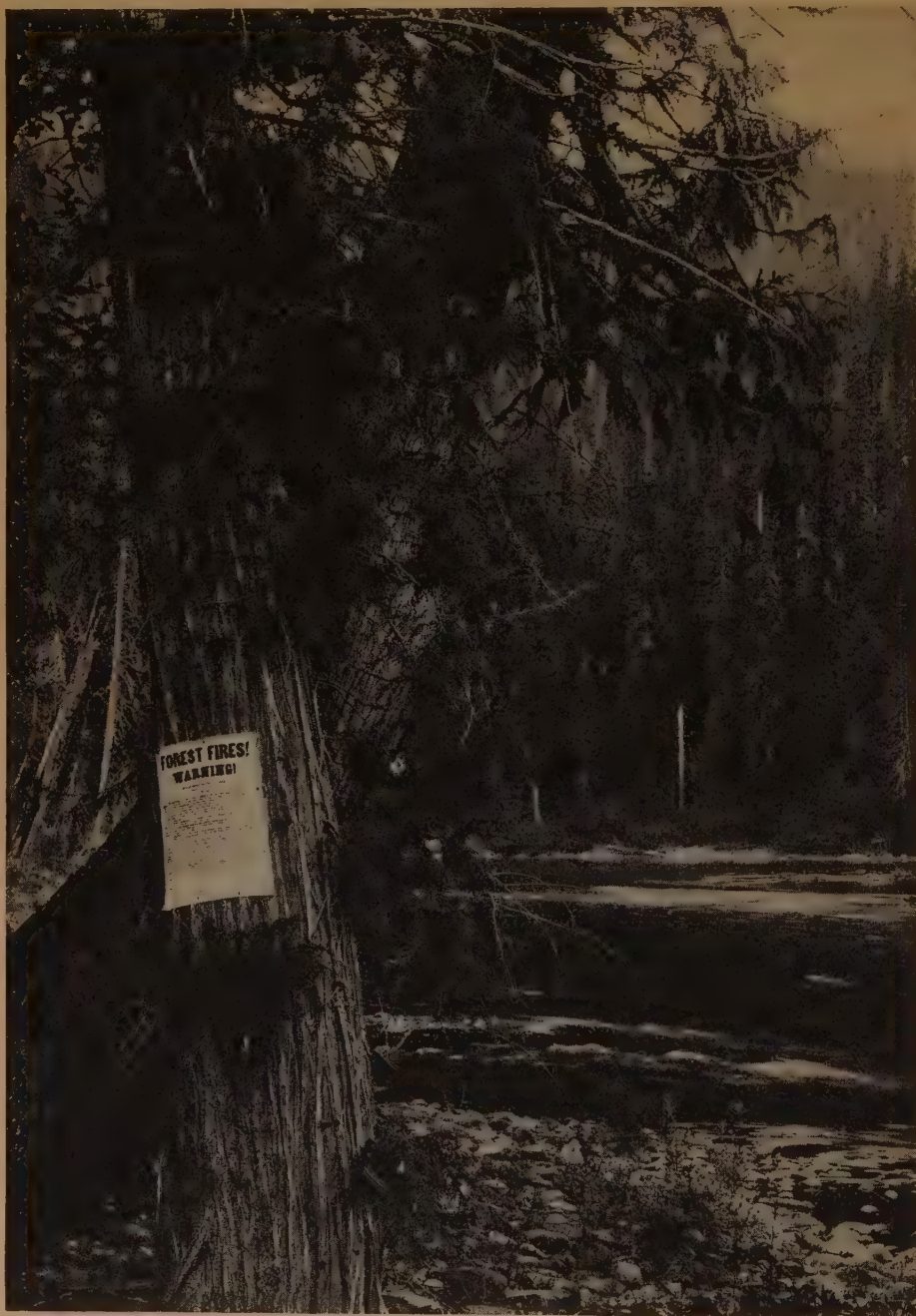
In this way, the trees of a tree city, fighting against each other by growing high and broad, helping each other by enriching the soil and keeping out the wind, all working together, produce the forest, one of the most beautiful things in nature, and one of the best friends of man. Our earliest ancestors lived in the forest, and today we can not have houses, or chairs, or even food or clothes, unless the forest helps us to get them. Wood is needed in making nearly everything we use, like the floor on which we stand. It is needed to help grow our food, as in the barns and fences of the farmer. It is needed to bring us everything we do not make at home, as in the railroad ties over which our trains run, and the wagon that delivers the groceries at our doors. You can not even use the telephone except by the help of the forest.

Without the forest, as you will learn from the story of the forests and forest protection, our mountain streams would run dry, or make destructive floods. Without the forest the life we live as human beings would be far less safe and comfortable and pleasant than it is today. The tree is one of the best of all our helpers.

A single tree standing by itself is not a forest any more than a single farmhouse standing alone is a town. The lone tree grows differently from the tree in the forest, just as the farm boy or the farm girl is different in some ways from the boy or girl in the city. Each does a most necessary work, but not the same. So we must remember that a tree and a forest are two very different and separate things. Shade trees are valuable, and to know their kinds and natures is well worth while. But when we have learned to know the trees, we may not have learned to understand the forest. To know a man is not to understand a city. So forestry is more than knowing trees. It is knowing how trees live together, how they help and hinder each other, what makes them sick and what keeps them well, and above all, how to govern the tree city so as to make it give us its timber and its beauty and all the pleasant things it can produce without lessening its usefulness to the boys and girls who will follow us when we are gone.

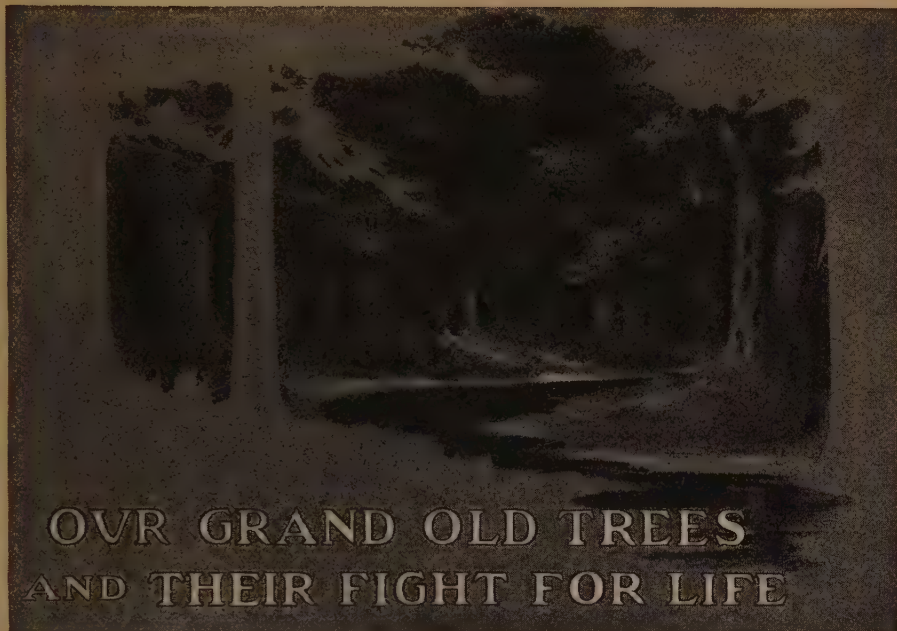
Lyfford P. Richok

A Warning in the Forest



Warnings as to the danger of forest fires and instructions for building, care and extinguishing of camp-fires are given in such notices as this on the big cedar tree.

OUR GOVERNMENT FOREST PRESERVATION



FOUR hundred years after Columbus discovered America, we made another discovery that was not nearly so pleasant.

Our forests were disappearing.

You may have heard grown people talking about the new work of the government—"saving the forests." To understand

When There Were Forests Everywhere it all you should know the story of the woods of America.

When white people first came to live here, three-fourths of our big country was covered with tall trees. Everywhere thick forests came down to the seashore, covered the mountain slopes and filled the valleys. Every stream had its wide belt of woodland,

and every prairie its beautiful groves. The Indians had no saws or axes. Fallen trees and branches kept their camp fires burning. To make their wigwams and canoes they used poles, bark and vines. Their little crops of corn, tobacco, beans and pumpkins were grown in open glades.

Why Indians Were Careful About Fires

Indians were never careless about fires. It was a terrible thing to the red man to have his shelter, and his scanty store of food and skins destroyed, and game scattered. Many forest fires were started by lightning, as they are today. Sometimes, when hard

When Indians Started Forest Fires

pressed by enemies, Indians did fire the woods so they could escape. And, in times of bitter famine, Indians started fires to drive what game there was into the open. Wind-driven flames, it is thought, swept the trees from our wide plains.

The white people who came to America could not live in the woods, as the Indians did, by hunting and fishing. For hundreds of years, in the old world, they had lived in warm houses. They had used wood in building homes, fences, bridges and ships, and in making furniture and tools. Europe, too, had once been thickly wooded, but centuries of use had made the remaining forests valuable. The kings and nobles who owned all the land, had forest officers who lived in the woods and patrolled the roads.

In America, nothing was so plentiful as trees. The forests seemed endless. People had to chop down trees to make fields for growing food plants, and pastures for horses and cattle. The logs were used to build comfortable cabins, strong forts, to fence the fields, cook food and warm the houses. Settlers cut their way westward through thick timber. Pioneers were obliged to de-

stroy great tracts of forests, in order to clear farms, build settlements and open roads for safe travel.

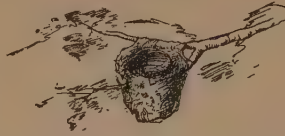
The Slaughter of the Trees

In New England a great deal of timber was used in ship building. But, in no place in the world perhaps, in so brief a time, was lumbering ever done on so gigantic a scale as when the treeless prairies back of Chicago were settled. That began in 1832, about eighty years ago. An old man who made a fortune in lumber in the fifties and sixties, told the writer about it.

"We lumber men bought pine lands in Michigan and Wisconsin, from the government, for one dollar and a quarter an acre. We set up saw-mills in the woods and mowed down the trees. We left mile after mile of barren land, on which neither trees nor anything useful has grown since.

"It seems wicked to me now, but we thought those forests would last forever. There were thousands of square miles of pine and hardwoods around the Great Lakes. We had a fifty years' carnival of tree slaughtering in what might be called America's 'wooden age.' For five hundred miles west of

Little Homes in the Big Woods



This nest was built by a little American vireo from silken tissues gleaned from the webs of spiders. Carefully drawing out the delicate threads, with deft movements of her bill, Mama Vireo twists them into strings, then neatly weaves and felts them into a strong, cosy home for her little ones. So substantially does Mama Vireo construct her home that other and stronger birds and even mice will use it after the baby vireos have grown lusty and strong and have flown away. Some times Mama Vireo cannot find enough silken webs to furnish the material for her home, so she ingeniously weaves in fragments of hornets' nests, flax or paper.



This is the home of the baby tailoring spider, commonly called the trifoliate spider, exterior and interior views. Mama tailoring spider selects a leaf, draws the left and right sides until they meet, then fastens them together with a delicate silk secretion. This done, she proceeds to make the vase-shaped cocoon that is to be the home of the baby spiders. Inside this weather-proof encasement she lays her eggs, swathing them in softest silken floss and covering them with silken sheets and blankets. The center picture shows the eggs inside the cocoon, with the silken coverlet thrown back. Just as soon as the baby spiders are hatched she wraps them in flossy swaddling-bands until they are strong.



Even the Soil was Killed!

"In everything we made, wood was wasted. Not one-third of a tree was used. Lumber camps and railroads in clearing their right of way, left the stumps, tops and branches on the ground, to dry out. A spark from a locomotive



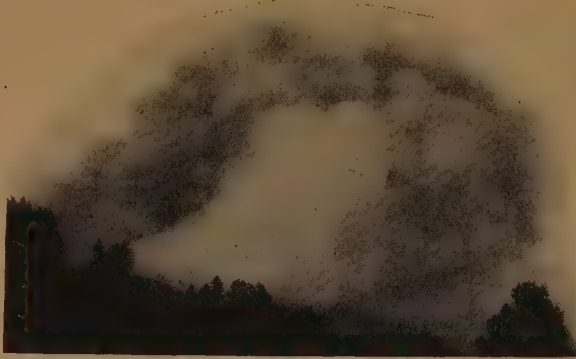
Chicago, all the towns and farm buildings were built of lumber. We laid miles of plank roads and sidewalks that rotted in a few years. We paved streets with wood blocks. We built wooden steamboats, cars, fences and bridges. We burned wood under the boilers of factories, steamboats and locomotives. Forests were cut down to make railroad ties, and to support the roofs of mines. Everything was shipped in wooden packing cases. Then spruce forests began to feed the paper mills to make print paper.

The Forester's Worst Enemy

or saw-mill set such litter on fire. The young growth on every cut-over forest tract was burned. Even the soil was baked and killed by the flames. Careless campers built huge

fires against punky logs, and left them smouldering. Settlers, in clearing timber lands for homesteads, were not careful in burning brush. Wads from shotguns, and cigars, thrown in dry leaves, have been known to start fires. For two hundred and fifty years the people of the United States misused and wasted their forests, and let them be ravaged by fire. They planted only orchard and a few shade trees."

Do you know that an average of



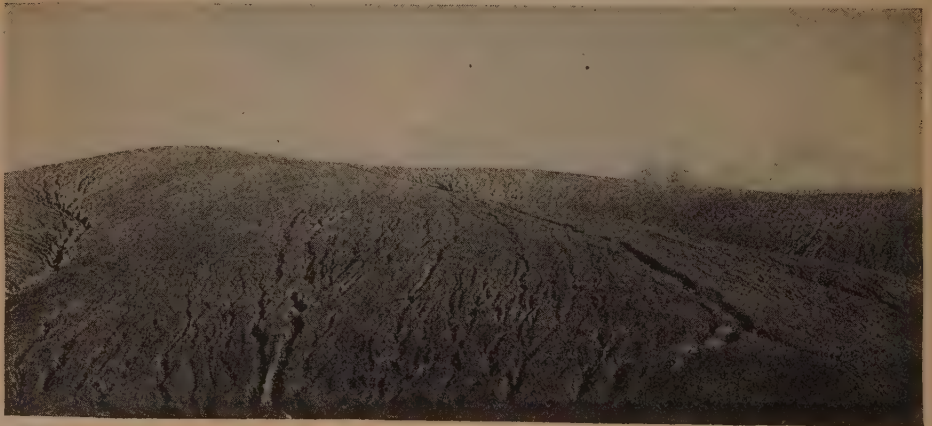
This huge cloud of smoke might be hanging over a battlefield or a big manufacturing city, but it was caused by a fire in the Wallowa Forestry Reserve, Oregon. It is the forester's business to protect the stately, sturdy pine trees from their enemy, the fire.

seventy people have been burned to death every year, in our forest fires, for nearly a hundred years; and \$25,000,000 worth of timber? Live stock, crops, buildings, fences,

even towns have been swept away by flames. Since 1825 there have been more than twenty great forest fires, that have destroyed sixteen million acres of timber. After the long, hot summer of 1871, the year in which Chicago, then a city of flimsy frame buildings, was burned, forest fires destroyed the lumber city of Peshtigo and more than three million acres of trees in Michigan and Wisconsin.

How Our Forests Were Burned Up

What Happens When the Trees Are Gone



"When the forests were gone the water ran down in floods, in the spring, washing good soil from the slopes. So, foothill farms were made barren."

The Right and Wrong Kind of Lumbering



Above is a forest utterly destroyed by the lumberman. There will be no new growth to take the place of the trees cut down. Below, the mature trees only have been cut. The saplings will grow up and replace the old trees that have been removed.

And After the Fires the Floods

Then it was found that, with the loss of the forests, came dreadful floods and droughts. The woods that once covered the mountain slopes, and lay about the head waters of streams, had held back the snows. Melting slowly the water sank into the soil, and reached the rivers gradually. But when the forests were gone the water ran down in floods, in the spring, washing good soil from the slopes. So, foothill farms were made barren.

But it was not until wood became scarce and dear that there was alarm. First we had to stop burning wood, and use coal. Then we used brick, stone and cement to make much better paving for the streets and walks. In many houses built today, wood is used only for floors, doors, and inside finishing. Steel beams and girders are now the "timbers" in business buildings, trestle work and bridges. We use steel for cars and ships. Many packing cases are now made of

*We Missed
the Water as
the Well
Went Dry*

strawboard. Experiments are being made with corn stalks and cane for paper material. The Japanese and Chinese make beautiful paper of rice straw.

Keeping the Trees in the Woods

Twenty years ago the government took account of its public owned forests. It found that there were still 195,000,000 acres of timber

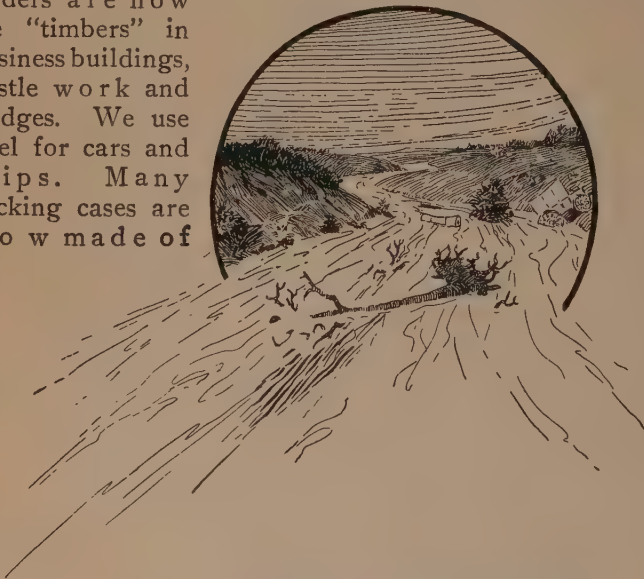
*Our
National
Forest
Reserves*

land that were owned by all the people. These tracts were made national forests by law.

They are all in eighteen states of the far and middle west, including 27,000,000 acres in Alaska and Porto Rico. These tracts are never to be sold. Many states, too, found that they had forests. Some had never been claimed by settlers, others had been taken back for unpaid taxes. New York alone has now 1,500,000 acres of woodland in the Adirondack and Catskill Mountains. Ten

states and the Hawaiian Islands are re-foresting millions of acres about the head waters of streams.

Some people have the idea that the national and state forests are parks, taken out of use, and to be kept up for their beauty. But they are being made of more use than they ever were. It is misuse and waste that has



Destroying Trees Invites Floods

Here is a valley filled with a roaring, raging torrent of water. When the trees have been destroyed, streams are swollen by melting snow and ice until they flood the surrounding country.

Raising Stock and Timber on the Same Land



Stock owners can obtain grazing permits allowing them to give their stock the run of the forestry reserves, on condition that no injury is done to the trees, but these permits are only for a specified



number of sheep or cattle. The upper picture shows a Colorado mountainside in the Holy Cross Forestry Reserve dotted with sheep. In the other you see the fall round-up of cattle on another reserve. A particularly fine member of the herd is looking at you from the insert at the right.

A School House in the Forest



"Settlers who take up homesteads in cleared places in the national forests, can have what timber they need for buildings, fencing and for firewood." It is called "free use" timber. This schoolhouse in an Arkansas reserve was built of such timber.

been stopped. Settlers who take up homesteads, in cleared places in the national forests, can have what timber they need for building, fencing and for firewood, free. Railroads can buy ties; mining companies and mills, timbers, for construction work. Stockmen can graze cattle in the forests under proper conditions. Campers can hunt and fish freely. But every tree that is cut must be first marked by a forest officer, and every one must obey orders about fires.

The Six Forest Districts

The national forests are grouped in six districts, with a forestry headquarters in a central town. There is an assistant, a chief of tree culture, a captain of grazing; and a chief of operation who directs the work of the forest rangers or patrolmen, in the field.

Over every forest is a supervisor with an assistant. They are skilled

foresters, trained in one of a dozen or more forestry schools. It is the business of these supervisors to make every rod of their forest grow tall, straight, timber trees. They must care for the seedlings, thin out too thick growth, start nurseries and transplant trees. They must start a new tree for every one cut out. You see, three-fourths of all our forests are still in private hands. The government wants to prove to timber land owners that forest culture pays. Many of the colleges with

forestry schools are now managing forest tracts and making money out of them; getting a crop every year, and providing crops for the future.

A forest ranger is just like a police patrolman. He watches every man and animal in the forest to prevent fires, improper lumbering and

A Forest Homestead



When agricultural lands are found inside the boundaries of a reserve they are thrown open to settlement. This does not happen often, for the national forest reserves were set aside because of their value as woodland, but here we see the wheat field, cabin and barn of a homesteader in the midst of the tall pines of the forest.

destruction of young trees. Railroads are being forced to clear dry rubbish from their rights of way.

Some railroads are using oil for fuel in mountain forest regions, so their engines will not throw out big sparks. People guilty of carelessness about fires in the forests, or those who start fires purposely, to "get even" with the owner, can be sent to prison. We have begun to think any forest fire that is not started by lightning, a disgrace to the country.

*Where
Carelessness
Is Criminal*

The Forest Fire Department

There are now nearly three thousand men who stand guard over our national forests.

That is not nearly enough. One ranger must often watch a hundred thousand acres of woods. He does this from hill tops and ridges. Roads and trails are being opened so rangers can travel more rapidly. Telephone wires are being strung so help can be gotten quickly. Tools, food, clothing are kept in cabins in the woods for fire fighters. Farmers, stockmen, miners, railroad section hands—all able-bodied men for miles around—are formed into volunteer fire companies. Railroads carry fire fighters free, and they are

A Fire Watchman's Lookout



"One ranger must often watch a hundred thousand acres of woods." He does it from a fire lookout station like this one on Santiago Peak, California. A telephone connects it with other parts of the forest.

rushed to the scene of the fire.

Besides its work in the national forests, the Forestry Bureau in Washington helps states and private

A Bridge for Forest Firemen



The Forestry Service builds bridges across the streams which might delay the fire fighters in time of need. This one is over the Wenatchee River in the Wenatchee National Forest, Washington. It is a suspension bridge, simple and cheap in structure, but effective.

Making Better Roads



"Roads and trails are being opened so rangers can travel more rapidly." At the right is the old road; above it, to the left, is the new one built by the Forest Service. This road reduces the grade from 21 to 6 per cent and is straighter, as you see,

Restocking Streams With Fish



© Keystone View

These men at the New York State Hatchery are collecting fish in large cans to restock the streams of the state. The cans look just like those used by the dairies to send their milk to market.

FOREST PRESERVATION

Weapons Used in the War Against Fire



"Tools, food, clothing are kept in cabins in the woods for fire fighters." Here is a box of them, open. You can see a row of bags for carrying water. Why is the box stocked with these instead of with water buckets? See if you can tell. Which takes more room, buckets or bags? The water sometimes has to be carried long distances. Which weighs more? Cans of food are stored down below the bags.

Fire Fighters at Work



These men may not *look* heroic but the work they do is dangerous and hard. They have several different ways of fighting forest fires. Sometimes they dig trenches to keep the fire from spreading on the ground; sometimes they clear a strip of ground of trees and rubbish; as a last resort they start a back fire, which of course they are careful to keep under control. It destroys the fuel in the path of the oncoming fire and so halts its progress.

Uncle Sam as a Lumberman



When the big, old trees are "ripe" they are cut and sold. If left standing they would interfere with the new growth and also deteriorate in value. Here is a miniature logging railroad in an Arizona reserve, loaded with big logs for market. The lower picture shows at close range one of the big wheeled carts used to drag the logs to the railway. You see two of them in the upper picture. "Loading" the log on the cart is done from beneath. The cart is run over the log it is to haul, straddles it and grapples it by chains hanging from the tongue.



supply himself with fuel, how to plant wind-breaks to shelter cattle.

owners of timber lands. It will examine a forest tract and tell the owner how to manage it to make it most profitable. It tells people how to start nurseries and plant trees. Many cut-over forests are being replanted. The Bureau will tell any farmer how to start and keep up a wood lot to

It will tell a town what shade trees to plant, when to plant them and how to care for them. It will tell a school how to observe arbor day. All the time, and every day in the year, it is telling all the people that we have no right to use our forests wastefully and selfishly, leaving none for those who will live here after we are gone. People always will need wood, as they will need coal and iron.

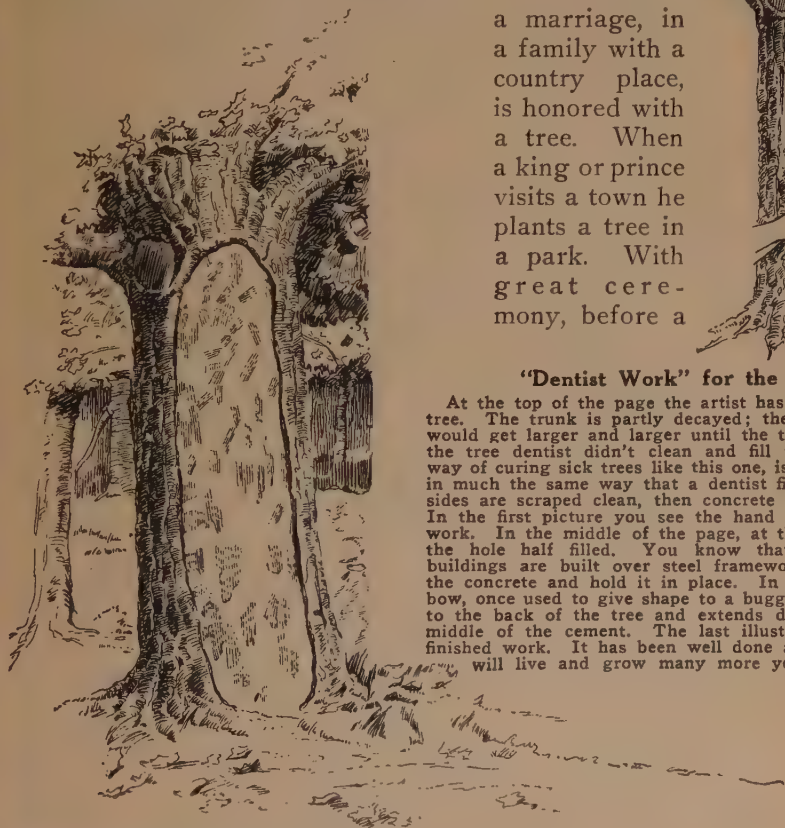
Planting Tree Memories in Europe

In traveling over the country one cannot help noticing the increase in tree planting. In all European countries it is thought to be a beautiful thing to plant a tree. A birth or a marriage, in a family with a country place, is honored with a tree. When a king or prince visits a town he plants a tree in a park. With great ceremony, before a



"Dentist Work" for the Trees

At the top of the page the artist has shown us a sick tree. The trunk is partly decayed; the great hole in it would get larger and larger until the tree finally dies if the tree dentist didn't clean and fill the cavity. One way of curing sick trees like this one, is to fill the cavity in much the same way that a dentist fills a tooth. The sides are scraped clean, then concrete is poured into it. In the first picture you see the hand of the dentist at work. In the middle of the page, at the right, you see the hole half filled. You know that concrete office buildings are built over steel framework to strengthen the concrete and hold it in place. In this case a steel bow, once used to give shape to a buggy top, is fastened to the back of the tree and extends down through the middle of the cement. The last illustration shows the finished work. It has been well done and the sick tree will live and grow many more years.



The Good Surgeon and the Trees



The bark of trees, like our skin, is not only a covering but it also protects the tissues underneath. When a doctor cuts off an arm or leg he leaves enough skin to cover the exposed flesh. When the limb of a tree is sawed off, the wounded trunk should be painted over. The first picture shows a rotten limb to be sawed off. Next the exposed wood is being painted. The third figure shows how the wound heals—without injury to the tree. Below, at the left, a limb has been sawed off and the wood left unpainted. At the right you can see what may happen if it is not protected. The wood is beginning to decay and dozens of tiny white worms are eating their way into it.



Insect Enemies of Trees



This is the bag-worm. He lives on shade trees and is one of their worst enemies. To protect himself he spins a silken bag with bits of leaves worked in. He wears this suit of clothes all the time. It does not fit very well, as you see, but it does not seem to hinder him in his daily hunt for food.



Here are some silver maple leaves showing how insects harm shade trees. The first picture shows a leaf that was attacked by the moth in its larval, or worm-stage, just after it had hatched from the egg. When he was a little older the larva ate a little more of the next leaf. The older he gets the more of the leaf he devours, and the full grown larva, ready to spin his cocoon and become a pupa, ate a whole leaf, as you see by the last picture, Fig. (f).

An Insect that Saws Wood

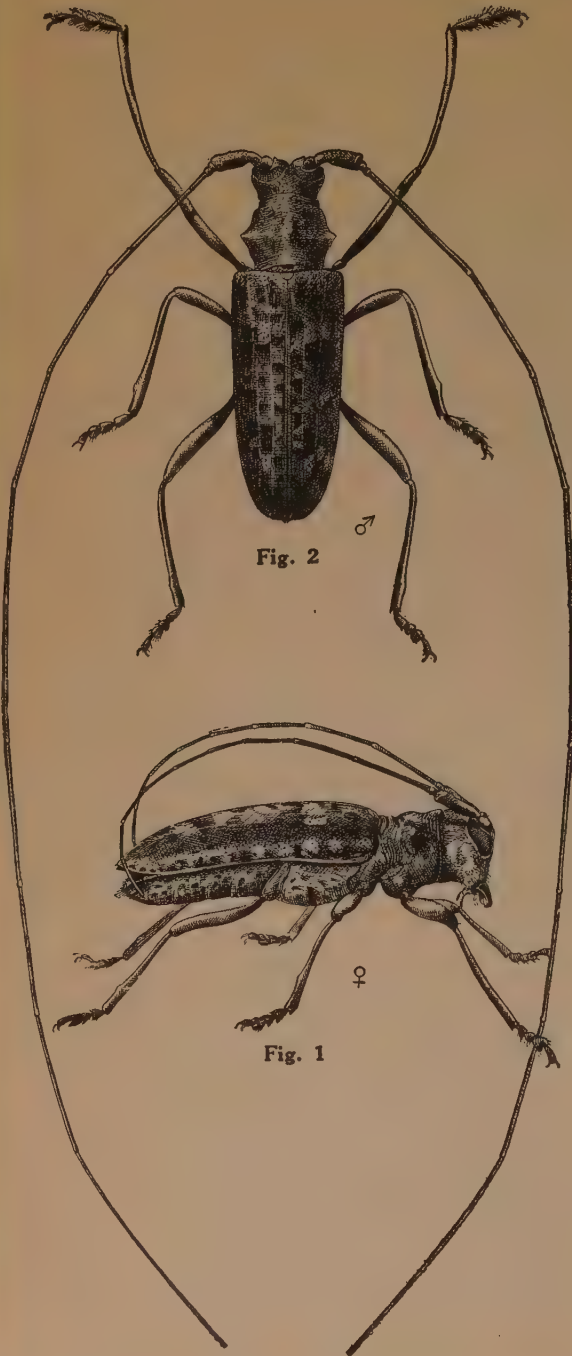


Fig. 2

Fig. 1

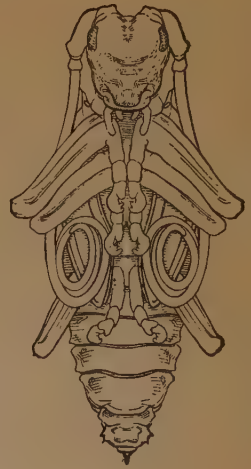


Fig. 3

These creatures don't look like woodcutters, do they? But that's what they are; their name is "Pine Sawyer," and they are a family of beetles which eat into fallen pine trees wherever they are to be found. Fig. (1) shows the female; Fig. (2) the male. The female scoops out a little pit in the bark of the tree and lays her eggs in it. These eggs hatch as white, grubby worms which eat their way to the heart of the tree and back again.

In a little room in the sapwood, just under the bark, they curl up and change to the pupa which you see in Fig. (3). The round, curled up things that look like two big eyes are the long antennae or feelers which you see on the male in Fig. (1). After staying in this worm stage for a varying length of time, sometimes all winter, they change to grown-up pine sawyers, and eat their way out of the tree, making a clean, round hole in the bark.

Pine sawyers do not harm growing trees, but wherever pine trees have been felled for lumber, they immediately begin work. One quarter of the wood in a log, which they have attacked, is made useless.

Raking the Leaves



Let us take our little garden rakes and go out into the yard under the trees and pile the dead leaves into a mound. It is such fun to hear the fallen leaves rustle under our feet. They will make a warm blanket to keep the flowers from freezing when winter comes.

crowd of people, General Grant planted an elm tree in Washington Park, Chicago, in 1872. It is a noble tree now, over fifty years old. A huge granite boulder lettered in gold, tells of this tree planting by a nation's hero. In the same year Mr. J. Sterling Morton started Arbor Day in the schools of Nebraska. Now every state in the Union has its tree planting day. It should be made more of a public festival. If a famous person is in the town he should be asked to plant a tree.

How Would You Like to Be a Forester?

The government Forestry Bureau in Washington publishes a great many forest service bulletins and

circulars. Most of them are free. For others a small charge is made. They are full of pictures of trees, forests, forest fires, logging and maps. Circular 167 "The Status of Forestry" gives a complete list of all publications, a list of the national and state forests, a list of schools and colleges where a boy can learn to be a forester. Circular 96 is on Arbor Day, and Circular 130 on Forestry in the Public Schools. You can get these circulars by writing a postal card to The Bureau of Forestry, Washington, D. C.

A fine elm, oak, rock maple, white ash, beech or other hardwood, or one of the fine cone-bearing evergreen trees takes from twenty to one

hundred years to get its full growth. Don't you think you would be doing a fine thing in starting one of these

fine trees? Some of them live for hundreds of years. This is one way to be a good citizen.

An Indian Girl's Work in the Forest

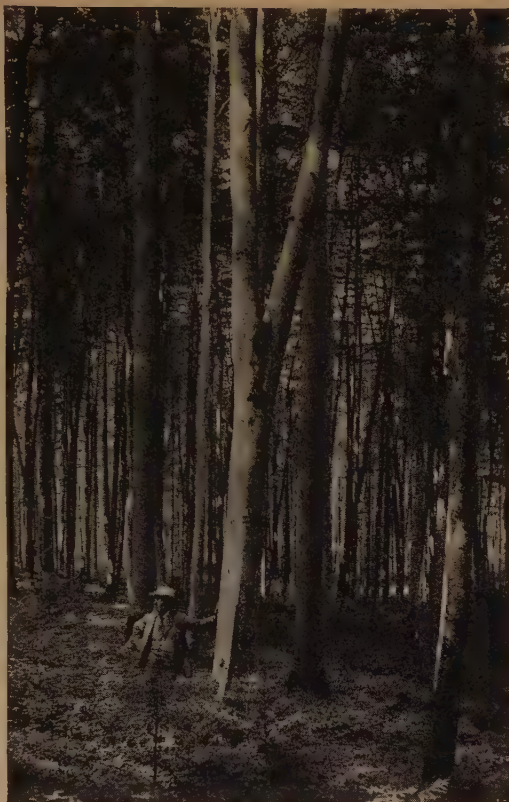


In an Indian village the squaws did all the tedious, hard tasks, as you know, and the braves did the heroic, dangerous things. One of the jobs that fell to this little Indian girl's lot was bringing in wood enough every day to keep the camp fire burning. Wood was not nearly so easy to cut with the awkward stone axes of the Indians as with our sharp steel ones, so her bundle of fagots is made up of the slender ends of branches instead of the big pieces split into kindling, which we think make the best fire. Don't you think she looks as though her load was pretty heavy?

Forestry in Europe

In European countries that are older and more densely settled than ours, a bit of woodland is precious. They have cared for and protected their trees much longer than we have ours. On the right is a fine old forest in Zurich, Switzerland. The ground is covered with a thick, natural undergrowth of young beeches.

Below you see a spruce forest developed on land unfit for agriculture. Notice the good road running through it. The picture was taken in Saxony, Germany.



Forestry in Europe



Here is a glimpse of a Thuringian forest. It shows a point in a forest of planted spruce where several roads run together.



The trees on the left of the trail have been thinned. Those on the right are ready for thinning. They are spruce.

Harvesting the Forest's Crop



The peeled spruce logs in the upper picture are ready for a German paper-pulp mill. The piles of kindling below are one-third of the annual cut of pine firewood from a city-owned forest in Germany. It belongs to the city of Grabow, Mecklenburg.

One of the Big Battleships of Our Navy



© Underwood & Underwood

You are looking down on the Wyoming, flag-ship of the Atlantic fleet, from a tower of the Manhattan bridge, New York City, as she is passing down the East River on her way to the summer maneuvers at Narragansett. Notice the great twelve-inch trivet rifles and the skeleton mast which is a type peculiar to the U. S. Navy. From the picture on the opposite page you can realize how enormous these guns are.

The Navy and its Work



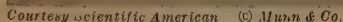
© Underwood & Underwood

Twenty-three Men on a Twelve-Inch Gun

The big guns which you saw on the opposite page are called "twelve-inchers" because they are twelve inches in diameter. Their length you may estimate from the fact that twenty-three of these good-humored young "jackies" find comfortable seats on this one. These expert young Americans know how to handle the guns so well that they make such records as five straight hits in fifty-seven seconds at a moving target five miles away.

THE Navy has always attracted a fine type of young man because of the opportunity it gives to render service of the highest importance to our country, of seeing all parts of the world, and of securing a practical education in many lines for one's life work after leaving the service. More trades are employed in the building of a ship than in any other single structure. Not only must a man in the Navy be thoroughly informed and trained for the particular task he is set to do, but he must be a man with a keen eye and capable of

quick decision and action. Naval battles are lost or won in a few minutes and a man spends most of his career getting ready for the supreme moment. The annals of the American Navy abound in records of brave and brilliant deeds of both officers and men, and the boy who enters the Navy will have the best traditions of high patriotism and noble service to inspire him to do his best; in the achievements of such men as Admiral Sims, Paul Jones, Admiral Dewey, Commodore Perry and Farragut, The Viking of the River Fight, the Conqueror of the Bay.



There are two ways in which a boy can serve in the United States navy. He can enlist as a common seaman, or can take the training for an officer in the Naval Academy at Annapolis, Maryland. To do either a young man must be at least sixteen years old, be strong in body, and love life on the water. Boys from fishing villages, and those who have been sailors on sea and lake merchant vessels, make fine seamen for the navy. They know much of the hard work on shipboard, and are fit for duty after a few months on a training ship. But good seamen and officers come from all parts of the country, even from the mountain and prairie states. In the six years' training at Annapolis two are spent on the practice ships, so a "landlubber" is broken in gradually.

scholarship. The president appoints one cadet from the District of Columbia, and ten from the country at large. The college course is much the same as at West Point, but the boy who is to command a naval vessel must also study seamanship, navigation, gunnery, marine engineering, ship-building and mechanics. And in the war college at Newport are special courses in steam and electrical engineering. In the arsenal on shore a naval cadet makes mechanical drawings. He helps make steel castings of the parts of ships and cannon. He helps take big and little guns to pieces and put them together again, for naval guns often need to be repaired at sea.

A battleship is a huge machine shop full of machines that have as many parts as a watch. Along both sides are the smaller guns that fire one hundred pound bullets six inch-

or the Battleship



carry five or six hundred thousand pounds of hard-frozen meat and similar amounts of other food in their insulated spaces are lined with zinc and packed with charcoal. They keep the compartments at a temperature for the Pacific. Another fine one is being built. These vessels follow the fleet around during

es thick, once every ten seconds. At the prow and stern, "forward and aft," a real sailor would say, are guns with gaping mouths fourteen inches wide. They hurl out steel shells that weigh several hundred pounds each. Those projectiles will go through twenty-one inches of armor plate two miles away, and, if not stopped, will go on for twelve miles. It takes just two minutes to load and fire one of these monsters. It took a Revolutionary soldier as long to load his firelock.

In the middle of the ship is a hollow steel tower, with a winding staircase that leads to the look-out room. In time of battle signal men are in the conning tower. With marine glasses they watch every movement of the enemy's fleet, miles away, through narrow slots in the eight inch walls. The commanding officer, through telephones and speaking tubes, directs every movement of the ship. He tells how it should be

steered, how to aim the guns and launch the torpedoes. By pushing an electric button he can fire a gun below.

It takes tons and tons of powder and other explosives to supply a battleship. This is stored below decks, "forward and aft." As the fires are always going to keep steam up, men stand on guard over the powder magazines to watch the heat gauges. If the walls become dangerously warm an electric alarm is sounded. Faithful little alarm clocks, they say:

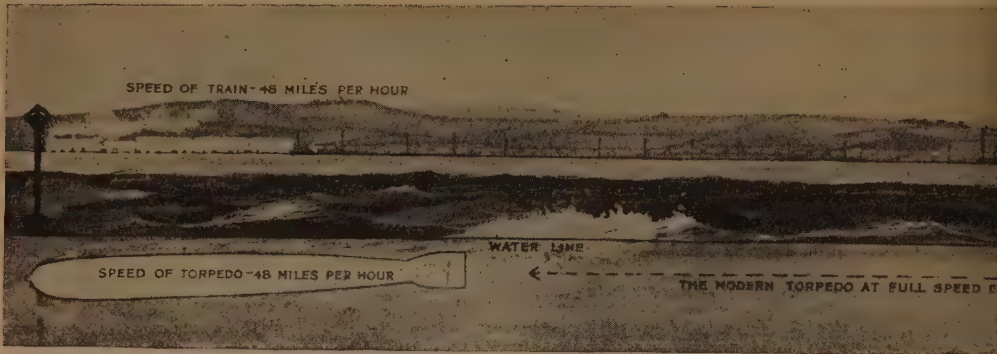
"Too hot! Better cool this place or you'll be blown up."

Besides the engine to pull the battleship, there are nearly a hundred special engines—to move the turrets, aim the guns, work the pumps, make electricity for dynamos and for the great searchlights that sweep the sea like the fiery eyes of a dragon.

Our Navy in the World War

The United States Navy did very important work in the World War in

The Modern High-Speed



The upper of these two pictures shows how a torpedo is launched from a ship. You will find another picture in picture language that it has the speed of a railroad train at forty-eight miles per hour.

The lower picture shows the inside of a torpedo and how it works. When it leaves the vessel only its own steering, just like a fish. On its way down the tube by which it is launched from the ship, the starting gas, heated, compressed air charged to a pressure of 1,500 pounds to the square inch. These engines revolve as a flying machine is driven through the air by its propellers.

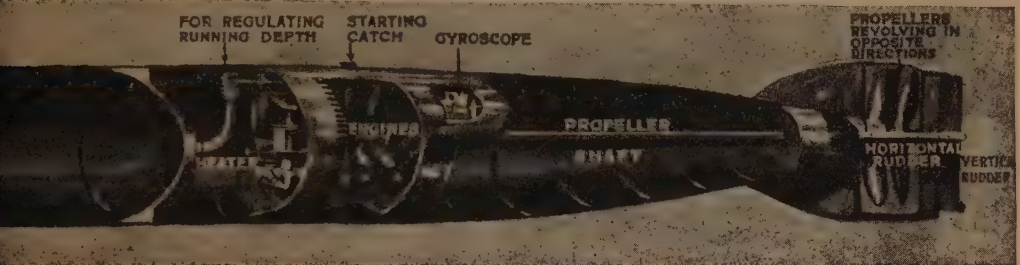
But here comes the strangest part of all! The "torpedo man" sets the torpedo at the depth at which it either to the right or to the left, no matter how much the waters may buffet it. It is controlled by means of wheels let it go. As long as its own rolling motion lasts it will not fall down—it resists the power of gravitation which would change its direction.

meeting the ruthless methods of the Germans with their submarines. Never was the courage, resourcefulness, and quickness of action for which the American fighting man on land and sea has always been notable put to a severer test. It takes a keen eye to see a periscope two thousands yards away, and a quick brain to direct the hand that trains a gun and fires at a small craft which can submerge in half a minute. Not only did our Navy, in co-operation with the great British Navy, succeed in making the anti-submarine war a complete success, but the accounts of the heroism, daring, and skill shown by our "jackies" would alone fill this whole

book; tales of gunners on merchant-men who stayed at their guns until the flames of the burning vessel reached the top of the smokestack; vessels such as the one which, under a rain of shells and hit nine times, fought a submarine four hours.

The United States Navy, although relatively small when the country entered this great war, was in such fine condition that within less than thirty days after war with Germany was declared, nearly every one of the larger American destroyers had crossed the sea and was co-operating with the British "Grand Fleet." Then, with wonderful rapidity, the Navy was increased in size to meet the new demands upon it. Within

Long-Range Torpedo



series showing a torpedo just as it leaves the ship. Here we see it going under the water, and the artist tells us how power is applied to start it in the water. After that it takes care of itself; it does its own "swimming" and its own steering. When you see, strikes against a projection and so starts the motion of the propeller's engines which are driven by two propellers which you see in the rear, and thus drive the torpedo along, just as a big steamship is driven, or a submarine proceeds, and it keeps exactly at that depth. Just as if it knew it will not go higher nor lower and it will not turn to the right or left, it is guided by a gyroscope, which works something on the principle of a hoop when you give it a good "send-off" and then it is free to tip it over. Similarly, the gyroscope is set in motion when the torpedo starts, and resists any tendency

a year from the declaration of war more than 250 new destroyers were built or practically completed, beside the patrol boats, mine layers, mine sweepers and cargo ships. Uncle Sam celebrated Independence Day, July 4, 1918, by launching fourteen new destroyers, and there were launchings nearly every day from that time until the armistice was signed that brought the World War to an end.

Naval Warfare Past and Present

Everybody likes to read about the great sea fights of Paul Jones, Admiral Nelson, Farragut and Perry. Even in the days of sailing vessels and small, short range cannon, a water battle was a terrible thing.

Longfellow described one:

"I remember the sea-fight, far away,
How it thundered over the tide."

But they should also read the thrilling stories of Admiral Dewey and Admiral Togo. Without the loss of a man or a ship our commander sank the Spanish fleet, silenced the shore batteries and captured Manila. It is true that the Spaniards had poorer ships, guns, and men than ours. But in the battle of the Japan Sea, Admiral Togo sank all but four vessels of the Russian fleet in a brief sea fight, because his men and guns were better than those of the enemy. On the sea it is not numbers, but perfect machinery, big guns, and skilled men that win battles.

PICTURED KNOWLEDGE
Recruits at a Naval Receiving Station



© Underwood & Underwood

Here we see applicants for admission to the navy filling out their applications. The scene is in New York City. Note that the officer is pointing out to one of the boys just how to fill in the various blanks. A sailor who is already in the service is showing the form and explaining it to the three young men who expect to sign in their turn. Notice the emblem of our navy on the left arm of the sailor and the officer. On the wall is a picture of a big battleship.

First Lessons in Splicing



One of the first things a young man learns when he enters the navy is how to splice a rope. This requires patience and skill and is good training, although not of so much practical importance as it was in the days of sailing vessels.

THE NAVY

Storing Potatoes on a Man-of-War



© International News Service

Where the Firemen Work



© Underwood & Underwood

This is a scene in the fire room of a battleship. Here the temperature at times rises to 130 or 140 degrees. Because of the dryness of the heat, the men do not suffer so much, however, as if the air were both moist and hot.

PICTURED KNOWLEDGE

Sailor Boys Scrubbing the Deck



© Keystone View Co.

The sailor boys are trained to keep their homes on the sea neat and clean. Here they are scrubbing the deck with good soap and water, backed by fine muscles. The water is supplied by the hose which you see.

Bringing in the Coal



© International News Service

Here you see a man-of-war taking on coal. The coal barge has drawn up alongside the big ship. The coal is shoveled into sacks, and then these sacks are lifted by rope and pulley and emptied into chutes which carry the coal down to the storage bins in the fire room.

THE NAVY

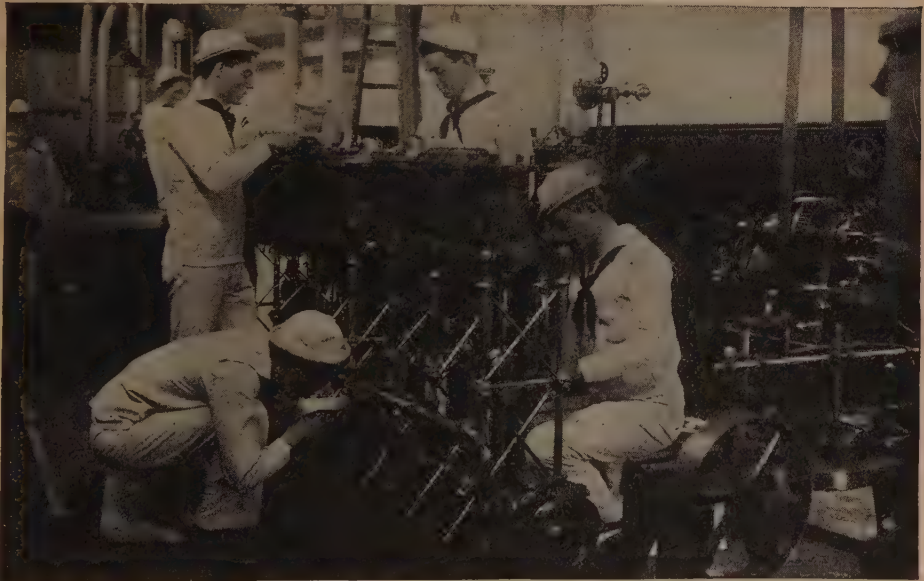
"After School" on Shipboard



© Keystone View Co.

The young men who enter the navy receive regular instruction on shipboard just as they would if they were attending school. Here we see the boys returning from an assembly "aft" for instructions.

Studying Mechanical Engineering on Shipboard



One of the most interesting, as well as one of the most useful, branches of a naval cadet's education is engineering. This is a picture of one of the departments of the United States Naval Academy in which the cadets are building an engine. When completed it will be all their own work.

PICTURED KNOWLEDGE

Athletic Sports on Shipboard



© Underwood & Underwood

Uncle Sam's sailors find a great deal of amusement mixed in with their work, for it is recognized that all work and no play is not good for Jack tars. Wrestling matches are especially popular. Here we see two champions of the Atlantic fleet engaged in a bout, while their companions are looking on and giving advice.

Strengthening the Rowing Muscles



© Underwood & Underwood

Watch this racing crew of a battleship going through exercises on shipboard to keep the rowing muscles in good shape. Notice the different expressions on the faces of the rowers—how the second boy puffs out his cheeks as if making a hard pull of it; how the one at the end of the line has his under jaw shot out; and how the young man next to him is laughing.

THE NAVY

At Rifle Drill



© Underwood & Underwood

The men in the navy are often obliged to do duty on land, so they are given drill with rifles just as land soldiers are, but while the use of the rifle is only an incident in the life of the "jackies" in the picture, it is the regular business of the soldiers of the sea known as "marines." They serve under their own officers and act as policemen on the ship. In a naval battle they act as riflemen and man certain of the smaller caliber and rapid-firing guns.

Artillery Drill at the United States Naval Academy



Here we see marines going through artillery drill at the United States Military Academy at Annapolis. It was training like this that enabled the marines to be of such service at a critical moment in the World War.

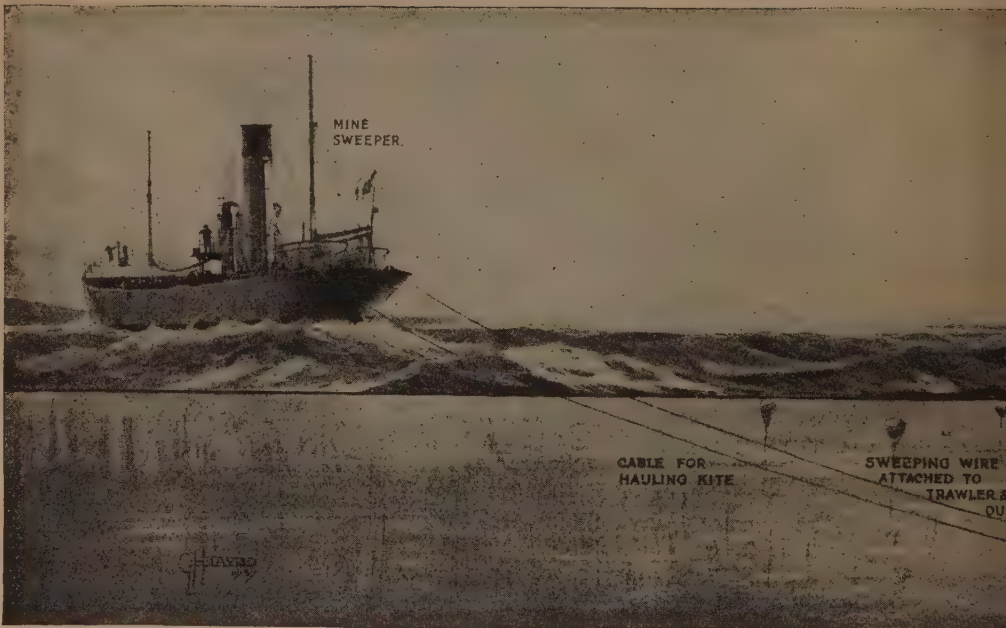


© International News Service

Practice in Mine Laying

This picture was taken during mine laying practice at Ft. Strong, Boston Harbor, and illustrates how a mine is charged. It is loaded with 150 pounds of powder and wet and dry gun cotton, and is usually anchored about fifteen feet below the surface of the water to protect harbors against entrance by hostile ships and the like.

How the Mine Sweeper



Of course, as there is a business of mine laying in the art of war, so there must be a corresponding business known as a mine sweeper. It's a very ticklish job, this hunting for hidden mines, but it is done, and success is grasped the mines as the cables drag along through the mine field.

Launching the Mine

Imagine that the mine you have just seen has been completed and that here it is being launched. It is first swung out on davits before being lowered to its place in the water.



© International News Service

Do Their Work



trying to find these mines and remove them. This illustration gives you an excellent idea of the work of what y. The device that tells where the bottom is located is called a kite. Attached to the cables are wires which

PICTURED KNOWLEDGE

How a Battleship Says "How Do You Do!"



© Underwood & Underwood

Here is a picture of a United States battleship saluting a sister ship which she is passing on her way to a naval review. She does this by firing a salvo of big guns.

Practice Target for the Gunners



Of course, it is just as important for a battleship to have skillful gunners as to have big guns. Here is a portion of one of the targets on which the gunners have been practicing. The reason there are not more holes in it is because seven successive shots went through the same hole—seven hits out of eight shots!

THE NAVY

Torpedo Leaving the Tube



This torpedo is being launched from the side of a torpedo boat. You can imagine what is going on inside of it from the sectional view you have already seen. Notice the point at the front. This is the part of the torpedo that does the damage, or, rather, causes it to be done. As you saw in the sectional view, when this point strikes the ship the torpedo explodes.

In the Wake of the Torpedo



© International News Service

This remarkable photograph, taken during torpedo practice of an American destroyer, shows the only visible indication of the passage of a torpedo through the water. It is for this streak on the water that officers on the bridges of ships are on the constant look-out in war time.

PICTURED KNOWLEDGE

Use of Mice on Submarine



One might suppose this to be a picture of a sailor and his pets. It is—in a way—because sailors in submarines naturally get very much attached to little creatures that perform such useful service for them. These mice tell them when they are in danger from the gas escaping from the petroleum with which submarines are operated. The mice first give warning to the men by squealing lustily as they play about in the ship's bottom. The fumes of petroleum always sink to the bottom of the vessel—right where the mice are; but you see, the men might not notice it until it was too late if it were not for the mice.

Submarines of the American Navy



© International News Service

THE NAVY

Going Aboard a Submarine



This shows a submarine at the Naval Academy where the cadets are being taught how to operate one of these "under-the-water" men-of-war.

Submarine Coming to the Surface After a Dive



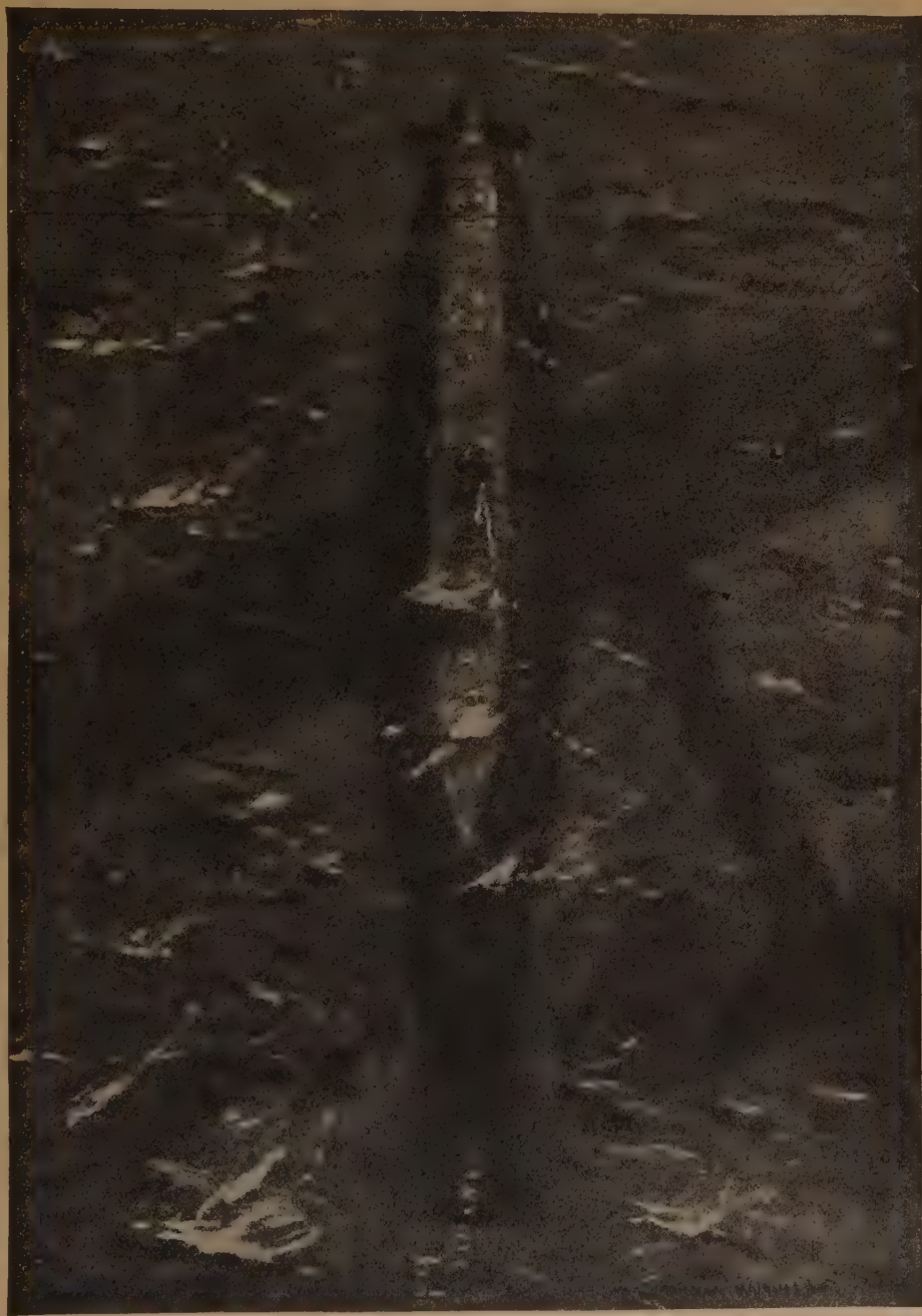
© International News Service

The Eye of the Submarine



This illustration shows very clearly how the lookout in a submarine can see vessels above water. The device which the officer is operating is called a periscope. The image of the ships is first caught in the mirror above water, then thrown down to another mirror from which the image passes at right angles to the eye of the observer who is looking through an instrument in the nature of a field glass, or telescope.

Aeroplane vs. Submarine



The shadow, as of a great bird's wings upon the water, is caused by a bomb-dropping aeroplane, the commander of which has detected a submarine beneath the waves.

PICTURED KNOWLEDGE

Uncle Sam's Sailor Mechanics at Work



© International News Service

Members of the crew of a naval repair ship are here shown repairing the range finders of a battleship after the instrument had been removed to their own boat, which is a veritable ship-builder's yard in point of equipment.

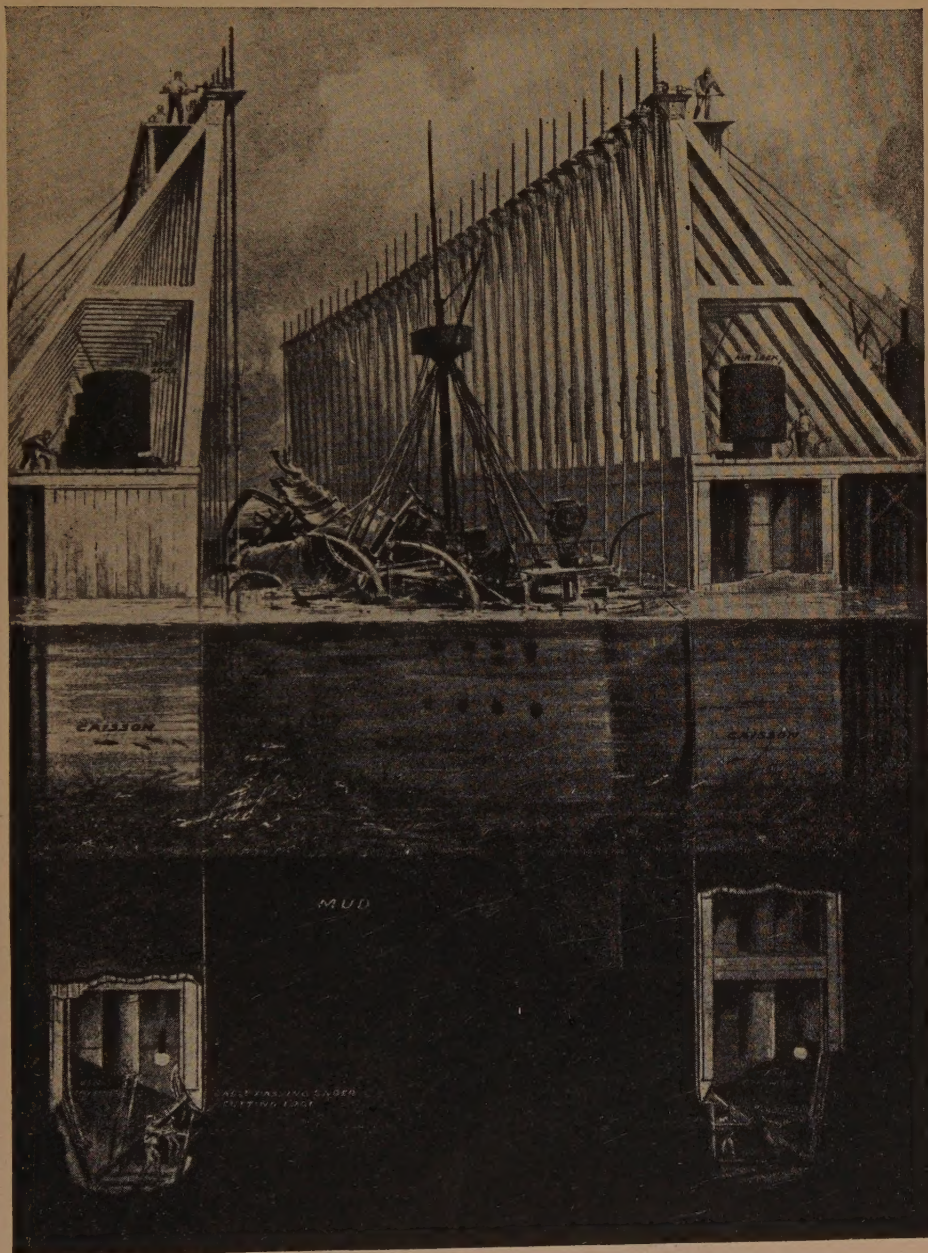
War Vessel in Dry Dock



© International News Service

This illustration shows how war vessels are repaired. They must, of course, be placed "high and dry" so that the machinists can get at them. These places for the repair of vessels are called dry docks.

How Sunken Ships Are Raised



Courtesy Scientific American. © Munn & Co.

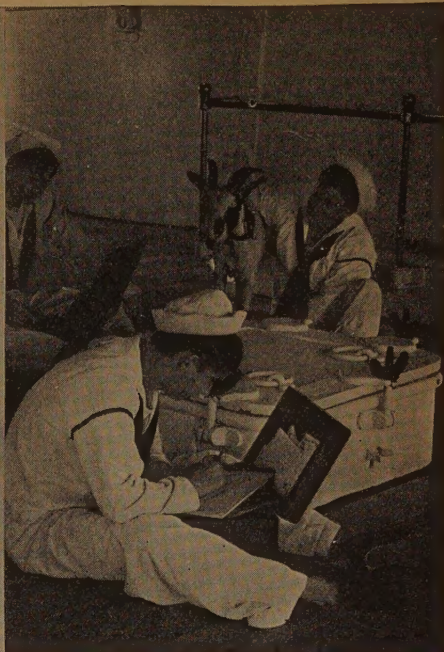
This illustration shows one method of raising sunken vessels. Caissons or air chambers are sunk between specially erected, heavy pile wharves and the wreck. After a ring of caissons has been made around the wreck, the water is pumped out from between the caissons and the vessel. Chains are then passed beneath the keel from air chamber to air chamber and the vessel lifted by powerful jacks.

PICTURED KNOWLEDGE

Reminders of Home



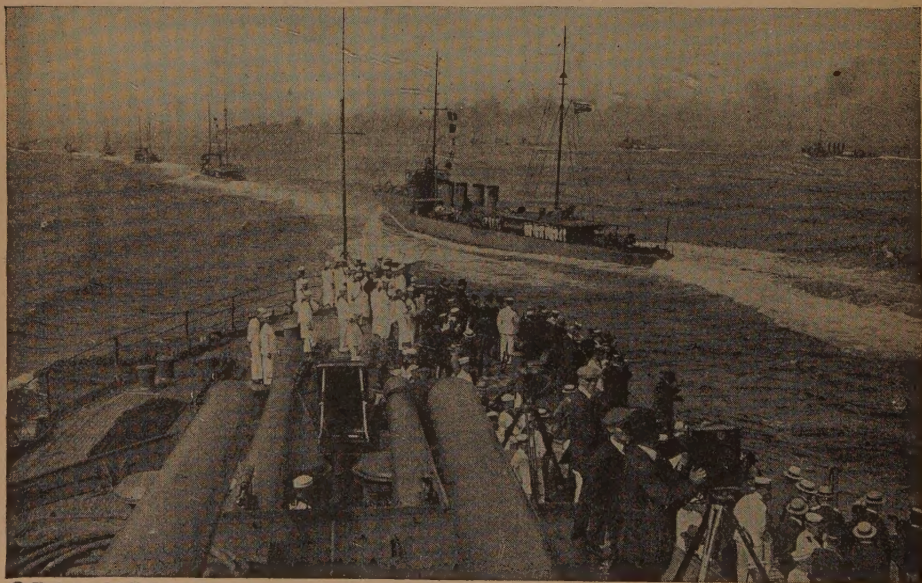
© Keystone View Co.



© Keystone View Co.

Here are two phases of life on the battleship which are reminders of home. In one picture the sailors are doing their own sewing, and in the other, two of the boys are writing letters to the home folks. One of the three in the second picture is amusing himself with the ship's mascot, a goat.

Reviewing the Atlantic Fleet



© Underwood & Underwood

This illustration shows a group of state governors at a review of the Atlantic fleet from the Wyoming. You notice the camera man is on hand and that is why we have all these interesting pictures to show you. The vessels you see are torpedo boats and they are passing at the rate of thirty-five miles an hour.



